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DESCRIPTION

OF ALL THE

BURSÆ MUCOSÆ

OF THE

HUMAN BODY;

THEIR STRUCTURE EXPLAINED,

AND COMPARED WITH THAT OF THE CAPSULAR LIGAMENTS OF THE JOINTS,

AND OF THOSE SACS WHICH LINE THE CAVITIES OF THE THORAX AND ABDOMEN;

WITH REMARKS ON THE

ACCIDENTS AND DISEASES WHICH AFFECT THOSE SEVERAL SACS,

AND ON THE

OPERATIONS NECESSARY FOR THEIR CURE.

ILLUSTRATED WITH TABLES.

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OF THE HONOUR THEY HAVE DONE HIM,

BY ELECTING HIM

ONE OF THEIR FELLOWS.

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DESCRIPTION

OF ALL THE

BURSÆ MUCOSÆ

OF THE

HUMAN BODY.

Sect. I.

INTRODUCTION.

ALTHOUGH the organs of which chiefly I am about to treat form a very curious part of our ſtructure, the knowledge of which will be frequently found of uſe in practice; yet the ſubject has been very unaccountably overlooked even by the lateſt and moſt accurate anatomiſts, and of courſe is little underſtood by phyſicians and ſurgeons.

It has been long and generally known to anatomiſts, that the tendons of the muſcles, at the wriſts and ancles, and in their courſe along the fingers and toes, are conducted in ſheaths; and it did not eſcape the obſervation of the accurate Winſlow, that theſe ligamentary ſheaths are lined with thin and ſmooth membranes (*a*). Still later, the very accurate B. S. Albinus diſcovered ſhut ſacs,

(*a*) Winſlow, Exp. An. Tr. des os frais, 286.

where there were no ligamentary ſheaths, interpoſed between the tendons and bones, to which he gave the name of *Burſæ Mucoſæ:* and of theſe he has deſcribed, in his Hiſtoria Muſculorum, ſixteen pairs (*b*). Winſlow, however, neither ſufficiently examined the extent nor ſtructure of the membranes lining the ſheaths of the tendons; nor does it appear that Albinus conceived that theſe membranes have, in all reſpects, the ſame ſtructure and uſes as thoſe ſacs he deſcribed under the name of Burſæ Mucoſæ; which we ſhall, however, afterwards find is the caſe.

SOME of the later anatomiſts have not attended to the diſcovery of Albinus (*c*): Others, and particularly the very learned Dr Haller, have miſtaken the nature of ſuch burſæ; ſuppoſing them to be formed of cellular membrane, like to that which covers the belly of a muſcle (*d*): While the greater number of the late writers in anatomy (*e*) content themſelves with repeating the deſcription of Albinus, without attempting to throw farther light on the ſubject.

SECT. II.

(*b*) B. S. Albini Hiſt. Muſcul. in 4to, 1734, p. 694.——Burſæ ſubjectæ muſculis, maxime tendinibus eorum, ad faciliorem mobilitatem.

In Iliaco interno.	*In Geminis.*
Latiſſimo dorſi,	Bicipite cruris,
Deltoide,	Semimembranoſo,
Terete majore,	Crurali,
Bicipite brachii,	Gracili,
Gluteo magno,	Gemello,
Gluteo medio,	Soleo,
Gluteo minore.	Tibiali antico.

Of all theſe a deſcription is given after that of the muſcles under the tendons of which they are placed.

(*c*) Cheſelden, Lieutaud Eſſ. An. Leber Præl. An. make no mention of Burſæ.

(*d*) Haller, Pr. Lin. Phyſ. 396, Celluloſam telam, quæ totum tendinem communis amplectitur, vaginam vocant, muſculi tunicæ ſimilem.—El. Phyſ. lib. XI. ſect. ii. § 39. p. 504. Ejuſmodi celluloſa tela in rotundos magnoſque globos congeritur; burſas vocat Albinus, qui varias enumerat. Precipuæ ſunt in poplite, et flexoribus tibiæ ſubjiciuntur.—J. J. Plenck Pr. Lin. Anat. 1775, 132. Hæc tela circa tendines laxam vaginam format.—Leber Pr. Anat. 1778. Textus autem celluloſus tendines ambiens vagina appellatur, p. 36.

(*e*) Sandifort, Deſcr. Muſcul. Hominis, 1781.—Sabatier, Tr. d'Anat. 1781,

SECT. II.

ORDER *in which the* SUBJECT *is to be treated.*

THE moſt diſtinct method of treating this ſubject will be,

To begin with a few general obſervations on the number, ſituation, and connection of the burſæ.

NEXT, To deſcribe the particular ſituation of all of them, with a reference to tables which repreſent them of their natural ſizes.

AFTER that, To explain accurately the ſtructure of each part which enters into the compoſition of the burſæ; and to compare their ſtructure, firſt, with that of the capſular ligaments of the joints; and then, with that of thoſe ſacs which line the containing parts of the thorax and abdomen.

IN the laſt place, To treat of the cauſe of the dangerous inflammation which generally follows wounds that penetrate into the cavities of the ſhut ſacs, and of the manner of preventing this.

SECT. III.

GENERAL OBSERVATIONS *on the Number, Situation, and Communications of the* BURSÆ.

THESE ſacs, ſo far as I have yet obſerved, are met with in the extremities of the body only.

THE Reader will therefore find them all delineated in five tables, repreſenting a fore and back view of the arm, the like of the leg, and a view of the ſole of the foot.

THEY

THEY are all delineated of their natural ſizes, after an inciſion had been made into each of them, and ſeveral of them were kept inflated while the painter drew them. As much of each of the muſcles, under which they were ſituated, is left attached to the bones, as is ſufficient to ſhow exactly the places they occupy, and to enable an anatomiſt to proſecute them by diſſection.

I HAVE found about one hundred and forty of them in all; to wit, thirty-three in each of the ſuperior, and thirty-ſeven in each of the inferior, extremities.

MANY of them are placed entirely on the inner ſides of the tendons, between theſe and the bones (*f*). Many others cover not only the inner but the outer ſides of the tendons, or are interpoſed between the tendons and external parts, as well as between thoſe and the bones (*g*).

SOME are ſituated between the tendons and the external parts only or chiefly (*h*); ſome between contiguous tendons (*i*), or between the tendons and the ligaments of the joints (*k*).

A FEW ſuch ſacs are interpoſed where the proceſſes of bones play upon the ligaments (*l*), or where one bone plays upon another (*m*).

WHERE two or more tendons are contiguous, and afterwards ſeparate from each other, we generally find a common burſa divided into branches, with which

(*f*) *See* Tab. I. D. Q. S. X. Z. l. m. n. o.——Tab. II. N.——Tab. III. M. R. S. V. Y. Z. b. c. k. Tab. V. I. M. S. U. V. f. l. n. t. x.——Tab. VI. N.

(*g*) *See* Tab. I. l. p. g. r. s.—Tab. II. Q. R. S. T. U. V. W. X. Y. Z.—Tab. III. V.—Tab. VI. F. H. L. R. S. T. U. V.

(*h*) *See* Tab. I. f. g. h. i. k.——Tab. III. l. m. n.

(*i*) *See* Tab. II. R. S.——Tab. V. n. o.

(*k*) *See* Tab. I. o. l. m. z.——Tab. II. S. X.——Tab. III. K.

(*l*) Tab. I. D. K. L.

(*m*) Tab. I. I.

EXPLANATION OF THE TABLES

WHICH REPRESENT THE

BURSÆ MUCOSÆ.

EXPLANATION OF TABLE I.

THIS Table repreſents the Burſæ Mucoſæ ſeen on the Fore-part of the Superior Extremity.

A. The clavicle.

B. The top of the ſpine of the ſcapula or acromion.

C. The forepart of the ſcapula.

D. A burſa under the tendon of the ſubſcapularis muſcle, which communicates with the cavity of the joint of the humerus.

E. The coracoid proceſs of the ſcapula.

F F. Two ligaments which tie the clavicle to the coracoid proceſs.

G. The head of the os humeri.

H. The body of the humerus.

I. A burſa mucoſa interpoſed where the clavicle is tied to, and plays on, the coracoid proceſs.

J. A ſtrong ligament which joins the acromion to the coracoid proceſs.

Tab. 1.

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A. Fyfe delt.

Tab. 11.

e. The ſheath of the tendons of the little-finger ſlit open, and the tendons drawn forwards to ſhow them fully.

f. A very large burſa mucoſa for the tendon of the flexor pollicis longus.

g. h. i. k. Four ſhort burſæ mucoſæ on the fore-part of the tendons of the flexor ſublimis of the fingers.

l. A large burſa mucoſa behind the tendon of the flexor pollicis longus, between it and the fore-part of the radius and capſular ligament of the wriſt and os trapezium.

m. A large burſa behind the tendons of the flexor digitorum profundus, and on the fore-part of the end of the radius and fore-part of the capſular ligament of the wriſt. In ſome ſubjects theſe two laſt deſcribed burſæ communicate with each other.

n. An oblong burſa between the tendon of the flexor carpi radialis and os trapezium.

o. A very ſmall burſa between the tendon of the flexor carpi ulnaris and os piſiforme *.

EXPLA-

* This, and likewiſe the burſa Z, were diſcovered by my aſſiſtant Mr Fyfe.

K. A large burſa mucoſa between the acromion and ligament J. and the capſular ligament of the humerus.

L. A ſmall burſa between the point of the coracoid proceſs and capſular ligament of the humerus. This is ſometimes wanting.

M. The tendon of the ſubſcapularis muſcle.

N. A ſmall burſa between it and the capſular ligament of the humerus, which frequently communicates with the cavity of that joint.

O. A burſa, which is ſometimes wanting, between the origin of the coracobrachialis with the ſhort head of the biceps muſcle and the capſular ligament of the humerus.

P. The tendon of the teres major turned outwards.

Q. A burſa mucoſa between the tendon of the teres major and the os humeri, and upper part of the tendon of the latiſſimus dorſi.

R. The tendon of the latiſſimus dorſi turned outwards.

S. A ſmall burſa mucoſa between the tendon of the latiſſimus dorſi and os humeri.

T. A burſa mucoſa within the ſheath of the tendon of the biceps flexor cubiti, between that tendon and the humerus.

U. The radius.

V. The ulna.

W. The tendon of the biceps flexor cubiti turned inwards.

X. A burſa mucoſa between the tendon of the biceps and tubercle of the radius. The tubercle of the radius is incruſted with cartilage lined with the membrane of the burſa; and within the burſa a *peloton* of fat projects.

Y. The origin of the extenſor carpi radialis longior.

Z. A ſmall burſa between a tendon common to the extenſor carpi radialis brevis and extenſor digitorum communis, and the round head of the radius.

a. The thumb, with the ſheath of the tendon of its flexor longus ſlit open.

b. The ſheath of the tendon of the flexors of the fore-finger entire.

c. The thick parts of the ſheath of the tendons of the flexors of the middle-finger ſhown.

d. The ſheath of the tendons of the flexors of the ring-finger ſlit open.

e. The

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A. Fyfe delt.

EXPLANATION OF TABLE II.

THIS Table repreſents the Burſæ Mucoſæ ſeen on the Back Part of the Superior Extremity.

A. The dorſum of the ſcapula.

B. The cervix of the ſcapula.

C. The acromion.

D. The capſular ligament of the humerus.

E. The tendon of the infra-ſpinatus turned outwards.

G. The tendon of the teres minor turned outwards.

I. The middle of the os humeri.

J. The external condyle of the humerus.

K. The internal condyle of the humerus.

L. The radius.

M. The ulna.

N. The olecranon.

O. The tendon of the triceps extenſor cubiti turned down.

P. A ſmall burſa between it and the olecranon.

Q. A burſa between the tendon of the abductor pollicis longus of Albinus and the radius.

R R. A large burſa common to the two extenſores carpi radiales.

S S. Another burſa common to the extenſores carpi radiales.

T. A third burſa at the inſertion of the tendon of the extenſor carpi radialis brevior.

U. An oblong burſa for the tendon of the extenſor pollicis longus; and which, at its fore-part, communicates with the burſa S S.

V. Another burſa for the tendon of the extenſor pollicis longus, between it and the metacarpal bone of the thumb.

W. The tendons of the extenſor of the fore, middle, and ring fingers.

X. A burſa mucoſa between theſe tendons and the ligament of the wriſt.

Y. Another burſa for the extenſor of the little-finger.

Z. A burſa mucoſa between the tendon of the extenſor carpi ulnaris and ligament of the wriſt.

EXPLANATION OF TABLE III.

THIS Table repreſents the Burſæ Mucoſæ which appear in a Fore View of the Inferior Extremity.

A. The ſpine of the os ilium.

B. The inner-ſide of the os ilium.

C. The os pubis.

D. The neck of the thigh-bone.

E. The root of the great trochanter.

F F. The thigh-bone.

G. The iliacus internus muſcle.

H. The pſoas magnus muſcle.

I. The inſertion of the iliacus internus and pſoas magnus into the trochanter minor.

K. A very large burſa mucoſa between theſe two muſcles and the capſular ligament of the thigh-bone.

L. The pectineus muſcle.

M. A burſa between the tendon of the pectineus and thigh-bone.

N. The adductor brevis of Albinus.

P. The gluteus minimus.

Q. The tendinous part of the gluteus medius.

R. A ſmall burſa mucoſa between the gluteus medius and trochanter major. Behind it the tendon of the pyriformis is inſerted.

S. A burſa mucoſa between the tendon of the gluteus minimus and trochanter major.

T. Part of the gluteus maximus which is joined to the gluteus medius.

U. Part of the vaſtus externus muſcle.

V. A burſa mucoſa between the gluteus maximus and vaſtus externus.

W. The patella.

X. The capſular ligament of the knee.

Y. The tendon of the extenſors of the leg cut and turned up.

Z. A

Tab. III.

F
Y
Z
a
W
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c
b
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Z. A large burſa mucoſa behind the tendon of the extenſors of the leg.

a. A communication which the burſa mucoſa of this ſubject had with the cavity of the joint of the knee.

b b. The ligament which joins the patella to the tibia cut, and its inner ſide turned outwards.

c. A burſa mucoſa behind it.

d. A large fatty *peloton* hanging down into the cavity of the burſa.

e. The tibia.

f. The fibula.

g. The back-part of the inſertion of the ſartorius muſcle turned forwards.

h. The tendon of the gracilis muſcle.

i. The tendon of the ſemitendinoſus muſcle.

k. A large burſa mucoſa behind the tendon of the ſartorius, and behind the tendons of the gracilis and ſemitendinoſus, covering the inner fore-part of the tibia.

l. The internal lateral ligament of the knee.

m. A burſa mucoſa between the tendon of the tibialis anticus and under part of the tibia and ligament of the ankle.

n. A burſa mucoſa between the tendon of the extenſor pollicis pedis longus and the tibia and capſular ligament of the ankle.

o. A burſa mucoſa for the tendons of the extenſor digitorum communis longus, between them and the tibia and ligament of the ankle.

EXPLA-

EXPLANATION OF TABLE IV.

In this Table a View is given of the Cavity of the Joint of the Knee and of the Burſæ above and below it, after making an Inciſion lengthwiſe at the Outer Edge of the Patella, and then raiſing the Patella ſo that its Poſterior Part is directed outwards.

A. The fore-part of the thigh-bone.

B. The trochlea of the thigh-bone in which the patella was lodged.

C. The back-part of the patella turned outwards.

D. The tubercle at the upper fore-part of the tibia.

E. The tendon of the extenſores cruris, running into the upper part of the patella.

F. The tendon or ligament from the under-part of the patella to the tubercle of the tibia.

G. A ſection of a large burſa mucoſa, placed between the tendon of the extenſores cruris and the fore-part of the thigh-bone.

H. The inner ſide of the capſular ligament of the knee.

I. The partition which ſeparates the burſa mucoſa from the cavity of the joint of the knee, formed by the membrane of the burſa and inner layer of the capſular ligament, joined together by cellular ſubſtance.

K. A burſa between the ligament which joins the patella to the tubercle of the tibia and the upper fore-part of the tibia.

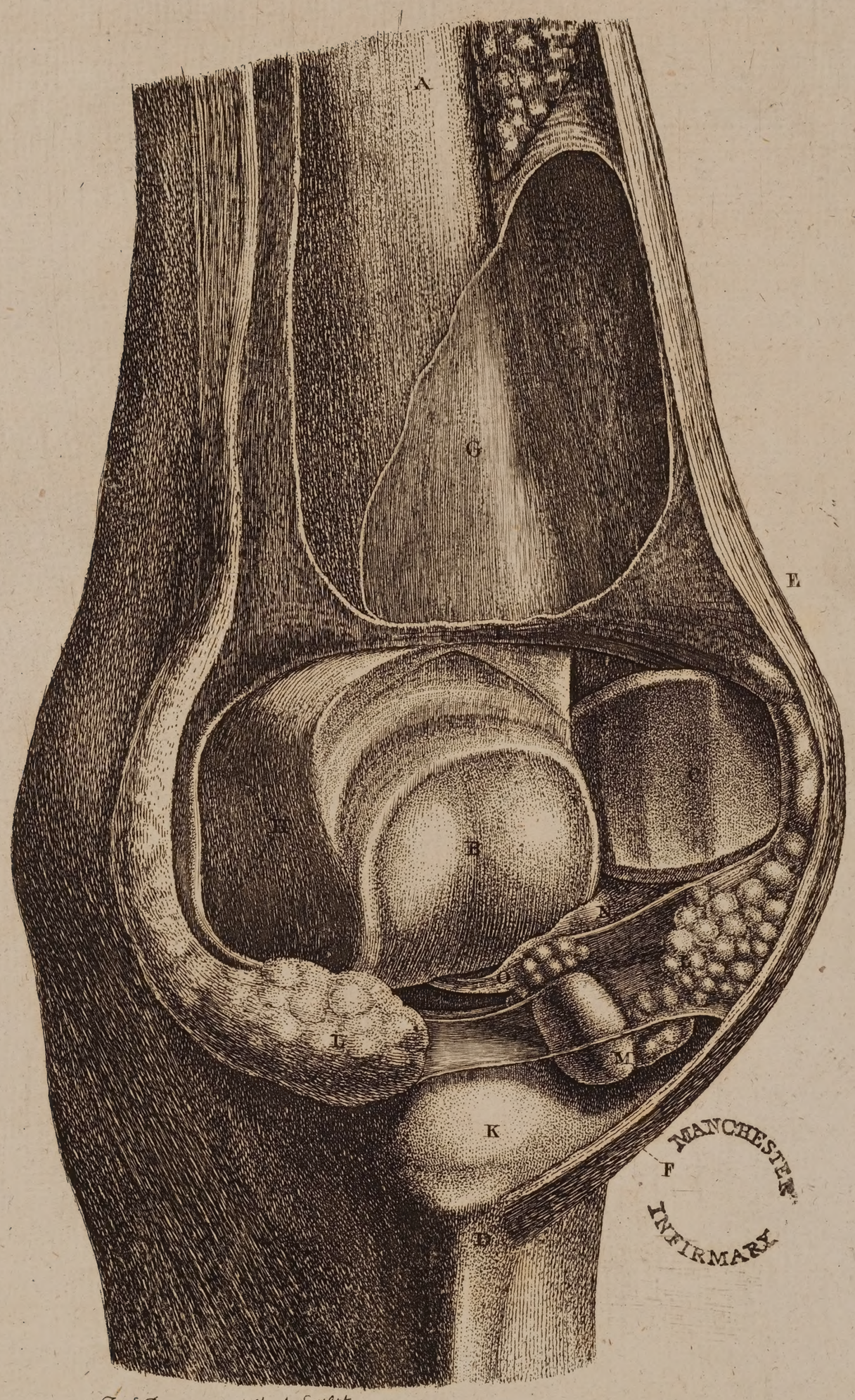
L L. A large maſs of fat, ſaid, erroneouſly, by authors, to contain within it ſynovial glands. The upper part of this maſs is covered by the inner layer of the capſular ligament, and the under part of it is lined with the membrane of the burſa mucoſa K.

M. The under portion of the fat projects into the cavity of the burſa K.

N. The upper part of this fat projects into the cavity of the joint of the knee.

O. A ligament by which this maſs of fat is tied to the thigh-bone between its condyles.

TAB. IV.



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TAB. V.

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EXPLANATION OF TABLE V.

IN this Table the Burſæ Mucoſæ, which appear in the Back View of the Inferior Extremity, are repreſented.

A. The dorſum of the os ilium.

B. The os ſacrum.

C. The os coccygis.

D. The tuber of the os iſchium.

E. The large trochanter.

F. The middle of the thigh-bone.

G. The gluteus minimus.

H. The pyriformis.

I. A burſa mucoſa between the gluteus medius and pyriformis.

K K. The obturator internus, cut acroſs where its fleſh is about to end in tendon.

L L. The muſculi gemelli.

M. A burſa mucoſa between the obturator and os iſchium.

N. A probe put into an oblong burſa mucoſa, which is continued to a dotted line between the obturator internus, gemini, and capſular ligament of the thigh-bone.

O. The quadratus femoris.

P. The origin of the ſemimembranoſus and long head of the biceps flexor cruris.

Q. A ſmall burſa mucoſa.

R. The origin of the ſemitendinoſus turned back.

S. A ſmall burſa mucoſa.

T. The tendon of the gluteus maximus.

U. A large burſa mucoſa between the tendon of the gluteus maximus and root of the trochanter major.

V W. Two ſmall burſæ mucoſæ between the tendon of the gluteus maximus and thigh-bone.

* The back-part of a large burſa between the tendinous parts of the gluteus maximus and vaſtus externus.

X. The internal condyle of the thigh-bone.

Y. The external condyle of the thigh-bone.

Z Z. The tibia.

a. The fibula.

b. The biceps flexor cruris turned downwards.

d. The inner head of the gaſtrocnemius gemellus turned upwards.

e. The ſemimembranoſus muſcle turned downwards.

f A burſa mucoſa between the tendons of the ſemimembranoſus and gemellus, and the ligament of the knee.

g. A ſmall burſa within the burſa f, from which there is a paſſage into the cavity of the joint of the knee.

h. A burſa mucoſa between the inner-ſide of the tendon of the ſemimembranoſus and the lateral internal ligament of the knee, from which there is a paſſage making a communication with the joint of the knee.

i. A ſmall portion of the popliteus muſcle.

l. A burſa under it, communicating with the cavity of the joint of the knee.

n. The tendon of the peronæus longus.

o. The tendon of the peronæus brevis.

p. A large burſa mucoſa common to the tendons of the peronæi muſcles.

q A burſa proper to the tendon of the peronæus brevis.

r. A ligament which ties the fibula to the os calcis.

ſ. The tendo Achillis turned down.

t. A burſa mucoſa between the tendo Achillis and os Calcis.

u. A *peloton* of fat which projects into the cavity of that burſa.

v. The tendon of the muſculus plantaris; one uſe of which ſeems to be, to agitate and compreſs the fatty and glandular organ U.

w w. The flexor pollicis longus and a burſa mucoſa between it and the os calcis.

x y. The flexor digitorum longus communis and a burſa mucoſa between it and the tibia and os calcis.

z z. The tendon of the tibialis poſticus, with a burſa mucoſa between it and the tibia and aſtragalus.

EXPLA-

EXPLANATION OF TABLE VI.

VIEW of the Burſæ Mucoſæ in the Sole of the Foot.

A. The os calcis.

B. The tendo Achillis.

C C. The abductor digiti minimi cut acroſs.

D. The tendon of the peronæus longus.

E. Another burſa mucoſa for that tendon.

F. An oblong *peloton* of fat within this burſa.

G H. The end of the fleſh and tendon of the flexor pollicis pedis longus.

I. A burſa mucoſa common to this tendon and the tendon of the flexor digitorum pedis communis longus profundus.

K. A fatty *peloton* at the upper end of this burſa.

M. An imperfect ſeptum between the two laſt named tendons; in the doubling of which there is ſome fat included.

N. The tendon of the tibialis poſticus in its burſa.

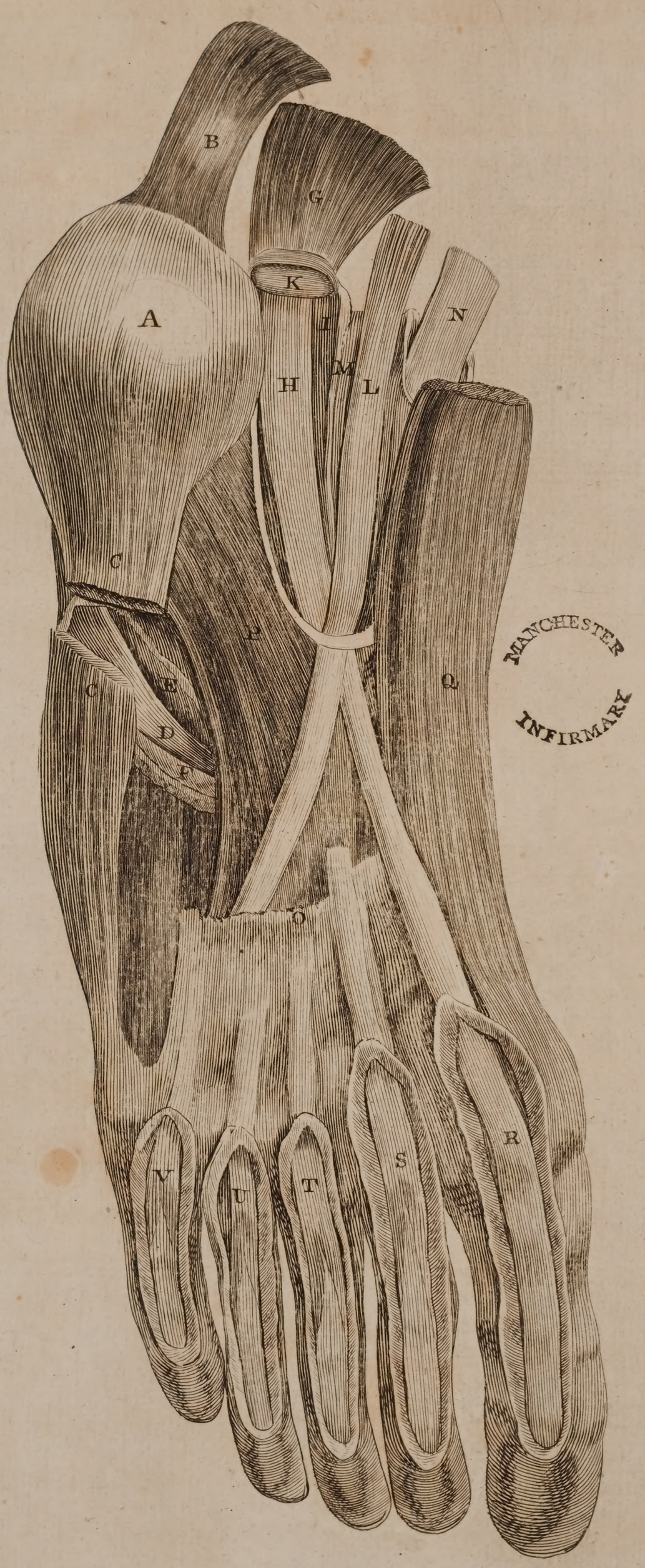
O. The place at which the flexor digitorum ſublimis is cut off.

P. The maſſa carnea Jacobi Sylvii, or flexor tertius.

Q. The abductor pollicis pedis cut off from the heel-bone.

R S T U V. Five burſæ mucoſæ of the flexor tendons ſlit open, and which begin a little above the firſt joint of the toes, and extend to the root of the third phalanx or inſertion of the tendons.

TAB. VI.



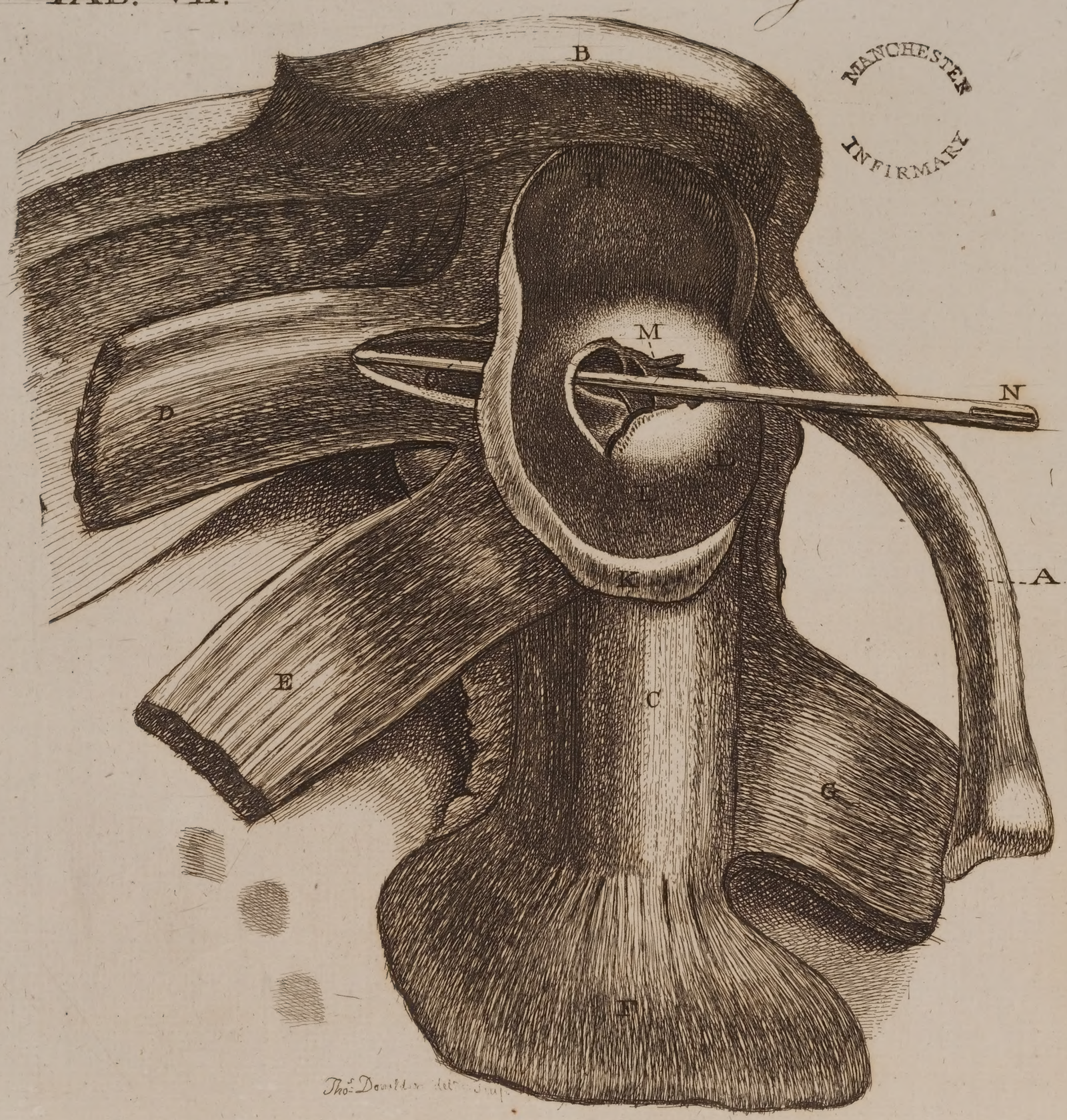
MANCHESTER INFIRMARY

T. Donaldson delt.

G. Cameron sculpt.

TAB. VII.

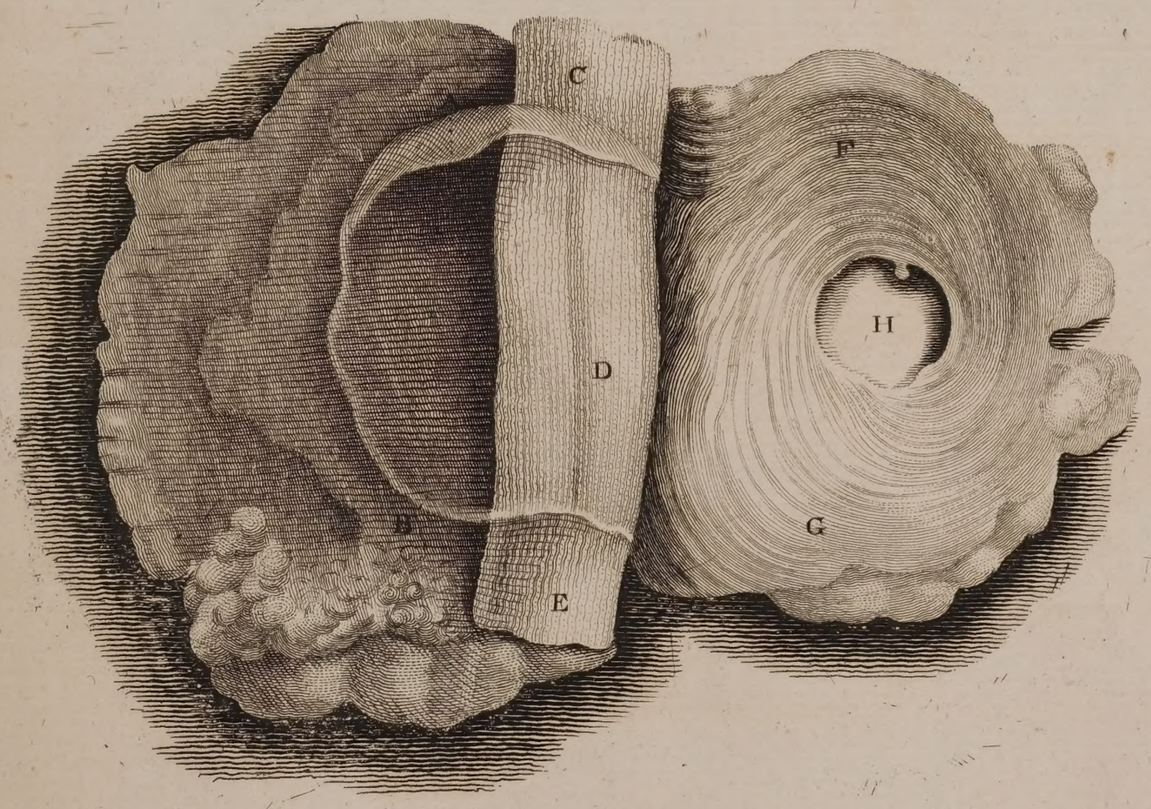
Fig. 1.



MANCHESTER INFIRMARY

TAB. VII.

Fig. 2.



T. Donaldson del.

J. Beugo sculp.

MANCHESTER INFIRMARY

TAB. VII.

Fig. 3.

SECT. V.

EXPLANATION OF TABLE VII.

IN the three Figures of this Table are delineated Holes worn by uſe in the Ligaments of Elderly Perſons; by which the Cavities of their Joints communicated with thoſe of the Burſæ.

FIG. I.

REPRESENTS a Hole worn in the Capſular Ligament of the Humerus on the Right Side.

A. The clavicle.

B. The top of the ſpine of the ſcapula or acromion.

C. The os humeri.

D. Inſertion of the infra-ſpinatus muſcle.

E. The inſertion of the teres-minor muſcle.

F. The inſertion of the deltoid muſcle.

G. The inſertion of the pectoralis major muſcle.

H K. A large burſa laid open, which is placed under the acromion, between it and the capſular ligament of the os humeri, repreſented in Tab. I. at the letter K.

L. The outer ſide of the capſular ligament of the humerus.

M. A hole, with ragged edges, worn in the capſular ligament of the humerus.

N. A probe paſſed into the cavity of the joint of the humerus.

O. The point of the probe ſeen in a ſac which communicated with the cavity of the joint, and was covered by the infra-ſpinatus; but which I have never met with in any other perſon.

FIG. II.

THIS Figure repreſents a Hole, ſuch as I have often found in Elderly Perſons, worn in the Fore Part of the Ligament of the Thigh-bone, where the Tendons of the Pſoas Magnus and Iliacus Internus Muſcles paſs over it.

A B. A large burſa cut open, which is interpoſed between the tendons of the pſoas magnus and iliacus internus muſcles, and the capſular ligament of the joint of the thigh, delineated in Tab. III. at the letter K.

C D E. The inner or back part of the conjoined tendons of the pſoas magnus and iliacus internus.

F G. The outer ſide of the fore-part of the ligament of the joint of the thigh.

H. A hole worn in the capſular ligament of the joint of the thigh, where the conjoined tendons of the pſoas magnus and iliacus internus played moſt upon it.

FIG. III.

IN this Subject two Burſæ Mucoſæ were found behind the Tendon of the Extenſores Cruris, both of which communicated with the Cavity of the Joint of the Knee.

A. The back part of the tendon of the extenſores cruris, with the two burſæ, diſſected away from the thigh-bone.

B. The back part of the patella.

C. The back part of the ligament from the patella to the tibia.

D D. The ſize of the largeſt burſa mucoſa, deſcribed by a dotted line.

E. The ſize of the ſmall burſa mucoſa, deſcribed by a dotted line.

F G. Two oval holes in the ſeptum, between theſe burſæ and the cavity of joint of the knee.

SECT. VI.

SECT. VI.

GENERAL OBSERVATIONS *on the* STRUCTURE *of the* BURSÆ.

HAVING conſidered the ſhape, ſize, ſituation, and connection of the burſæ mucoſæ, we ſhall now more particularly attend to their ſtructure.

THE proper membrane of the burſa is thin and tranſparent, but very denſe and capable of confining air or any other fluid.

IT is joined to the neighbouring parts by the common cellular ſubſtance. Between the burſa and the hard ſubſtance of bone a thin layer of cartilage or of tough membrane is very generally interpoſed.

To the cellular ſubſtance on the outſide of the burſa, the adipoſe ſubſtance is connected; except where the burſa covers a tendon, cartilage, or bone much expoſed to preſſure and friction.

IN ſeveral places a maſs of fat, covered with the continuation of the membrane of the burſa, projects into its cavity: And, in all ſuch places, the membrane covering the fatty ſubſtance has a red colour, from the number of blood-veſſels which run on its outer ſide, or between it and the fat; and from the edges and extremities of the fatty ſubſtances fringes project (*r*).

THE inner ſide of the membrane of the burſa is not only ſmooth, but, by the copious ſecretion of a lubricating liquor, is rendered extremely ſlippery.

SECT. VII.

(*r*) *See* Tab. I. X.—Tab. III. d.——Tab. IV. M.—Tab. V. u.——Tab. VI. F.——Tab. VIII. fig. 16, 17.

SECT. VII.

COMPARISON *of the* STRUCTURE *of the* BURSÆ *with that of the* CAPSULAR LIGAMENTS *of the* JOINTS.

WE are at firſt ſight ſtruck with the reſemblance which the ſtructure of the burſæ bears to that of the capſular ligaments of the joints; and the more attentively we purſue the compariſon, the more juſt and perfect their agreement will be found.

1. THE internal membrane of the ligaments of the joints, like that of the burſæ, is thin and denſe.

2. IT is connected to the external ligaments by the common cellular ſubſtance.

3. BETWEEN it and the bones, layers of cartilage or the articular cartilages are interpoſed.

4. AT the ſides of the joint, where it is not ſubjected to violent preſſure and friction, the adipoſe ſubſtance is connected with the cellular membrane.

5. WITHIN the cavities of the joints we obſerve maſſes of fat projecting, covered with ſimilar blood-veſſels, and with ſimilar fimbriæ or fringes hanging from their edges (*s*).

6. IN the knee we may obſerve the upper part of ſuch a maſs of fat, forming what has been called *the mucilaginous gland of the joint;* and the under part of

(*s*) Compare in Tab. VIII. fig. 1. 2. &c. to 15. with fig. 16. and 17.

of it projecting into the burſa, behind the ligament which ties the patella to the tibia (*t*).

7. THE liquor which lubricates the burſæ has the ſame colour, conſiſtence, and properties, as that of the joints; and both, as I have found by experiment, are affected in the ſame manner by heat, mineral acids, and ardent ſpirits (*u*).

8. IN ſome places the burſæ conſtantly communicate with the cavities of the joints (*x*); in others they generally do ſo: From which we may infer a ſameneſs of ſtructure.

9. To render the ſameneſs of the ſtructure of the burſæ and capſular ligaments ſtill more evident, I ſhall next minutely deſcribe the appearance of the ſeveral organs which may be ſuppoſed to furniſh the lubricating liquor, which, in the joints, has been called *ſynovia;* and I ſhall be the more particular, becauſe theſe parts have been generally very erroneouſly deſcribed, eſpecially by late writers, and that no author has yet examined them with ſufficient accuracy.

(*t*) *See* Tab. III. d. and Tab. IV. M. N.

(*u*) Immediately after an ox was killed, I opened the joints and large burſæ of the legs, and collected the liquors they contained.

Theſe were ſimilar to each other in colour, ſmell, taſte, conſiſtence, and weight; and gave the ſame degree of ſlipperineſs when rubbed between the thumb and finger.

When mixed with oil of vitriol, diluted with double its weight of water, both liquors became demi-opake, but were not coagulated.

When two parts of theſe liquors were mixed with three parts of rectified ſpirit of wine, a portion, weighing nearly one-eighth part of the whole, was coagulated.

When theſe liquors were brought to a boiling heat, they became leſs pellucid and more viſcid; but the quantity of matter which clotted was very inconſiderable.

When evaporated to dryneſs, they produced a tough cruſt, which weighed a ſmall part only of the whole, and burnt in the flame of a candle nearly as a thin ſlice of horn does.

(*x*) *See* Tab. I. D.—Tab. III. Z. a.—Tab. V. g. h. l.

I SHALL firſt deſcribe the ſtructure of the fat, and afterwards that of the mucilaginous, glandular, or ſecerning organs.

IT has been obſerved by Dr Havers (*y*), that the marrow conſiſts of globules; and, viewed through a magnifying-glaſs, looks liked a cluſter of pearls.

MALPIGHIUS, and after him Morgagni, made the like obſervation concerning the fat elſewhere in the body: He was, however, doubtful whether the fatty globules were contained in a proper membrane (*z*).

THE globules in the fat have been ſuppoſed to be much larger than thoſe of the marrow; and it has been, in the moſt poſitive manner, denied by the learned Fr. Grutzmacher, who wrote on this ſubject in 1748, that the marrow and fat are incloſed with a peculiar membrane (*a*): And, conſiſtent with this, the common opinion, ſupported by the authority of Winſlow (*b*), and by the ſtill later authority of Heiſter, Haller, Lieutaud, Sabatier, Plenck, Leber, &c. (*c*), is,

(*y*) Cl. Havers, Oſt. Nov. 1691. p. 167.

(*z*) M. Malpighii, Oper. Omn. Londin. 1686. De omento, pinguedine, et adipoſis ductibus. An vero ſinguli adipoſi globuli propria rurſus inveſtiantur pellicula oculus pertingere nequit.——Morgagni, Adv. Anat. 11. p. 16. Tota adipoſa membrana ex ſacculis conſtat; ſacculi autem pinguiferis globulis, quaſi glandulosis acinis, referti ſunt.

(*a*) Fr. Grutzmacher, De Oſſium Medulla, Lipſ. 1748. § XII. In pinguedinis particula microſcopio luſtrata, corpuſcula quidem in exteriori nimirum ejus parte invenimus, convexa et figura quadam irregulari prædita, aſt longe majora iis quæ in medullæ exteriore interioreve ſubſtantia fuere obſervata.——§ XI. Pinguedo æque ac medulla nulla cingitur peculiari membrana.—Contextus ille cellularis, in quo oleum animale ſive pinguedo continetur, ſine ulla fere cellularum deſtructione inflari poteſt.

(*b*) Winſlow, Tr. des Tegum. § IV. 69. Les bouchers gonflent la membrane adipeuſe, &c.——70. Les interſtices cellulaires ſont comme autant de petits ſacs remplis d'un ſuc huileux, que l'on appelle graiſſe.——Tr. des Os Frais. 74. La moelle eſt diviſée en une quantité des veſicules ou cellules membraneuſes, qui tapiſſent les cellules oſſeuſes et communiquent toutes enſemble.

(*c*) Heiſter, Comp. Anat. 1732. p. 73. § 20. De pinguedine.—Haller, El. Phyſ. T. I. p. 33. Cellulæ adeo variæ figuræ, adipi ſunt pro loculis;—ab uno ad omnes via patet.—Figura utcunque rotunda

is, That the fat is lodged in the cells of the common cellular membrane. And as the fat is commonly much waſted in dropſical conſtitutions, it has been taken for granted, that when the fat was waſted the water occupied its place.

In 1762, the late Dr W. Hunter (*d*), after taking notice of the general opinion that the oil of the adipoſe membrane is lodged in the ſame cavities as the water of the anaſarca, ſays, That he had long thought differently; "and that "wherever there is fat, he apprehends that there is a glandular apparatus ſuper-"added to the reticular membrane, conſiſting of veſicles or bags for lodging the "animal oil, as well as veſſels fitted for its ſecretion."-----He then ſpecifies his reaſons for this opinion; and, in p. 36, propoſes the following query: "From "all theſe obſervations, may we not then reaſonably conclude, that the oil of "the cellular membrane is lodged in particular veſicles; and not, as the wa-"ter of an anaſarca, in the reticular interſtices of parts?"

HIS arguments render his opinion extremely probable: but it is plain that he had not examined the ſtructure with the microſcope; by which alone it can be aſcertained.

LONG before Dr Hunter wrote, and indeed long before he began to ſtudy, my father uſed to obſerve (*e*), and in his annual courſes of lectures to demonſtrate, that the marrow, viewed with the microſcope, looked like a cluſter of pearls. To this I had added the obſervation, that after a good injection of the veſſels, a vaſcular membrane could be ſhown ſurrounding each of the globules; and from which the marrow was beyond doubt ſecreted. I afterwards found, on

eſt, cum ipſe adeps ſponte ſe in rotundas glebulas colligat.——Lieutaud, Eſſ. Anat. 1766. p. 105.——Sabatier, Tr. d'Anat. 1781. T. I. p. 14. La moelle eſt compoſée de veſicules membraneuſes qui communiquent toutes enſemble.—P. 15. De membranes que l'on peut diſtendre en ſouflant.—T. 3. p. 355. On ſait que les cellules du tiſſu adipeux communiquent toutes les unes avec les autres.——Plenck, Pr. Lin. Anat. 1775, p. 176.——Leber, Anat. 1778, p. 110

(*d*) Med. Obſ. 1762, Art. II. p. 33.

(*e*) *See* the firſt edition of his Oſteology, 1726.

on applying the microſcope in like manner to the fat, not only of man, but of other animals, that it is every where contained in ſpherical bags, painted with veſſels reſembling in ſize, as well as in ſtructure, thoſe of the marrow; none of which in diameter exceed the ſix-hundredth part of an inch, nor are leſs than one eight-hundredth part of it (*f*). Holes in the ſides of theſe bags, or ducts leading from them and connecting them to each other, are not diſtinguiſhable, even with a microſcope of high powers. In the hope of diſcovering more fully the texture of the adipoſe follicles, I have repeatedly examined with the microſcope the texture of large ſteatoms; in which I was a good deal ſurpriſed to find the follicles not only as regularly ſhaped, but nearly as minute as thoſe of the fat in a ſound ſtate: Nay, I have often in the ſame perſon compared the fat of the ſound cellular texture with that of a ſteatom, without being able to perceive any difference. I have, beſides, tried the experiment of holding a thin portion of fat between my finger and thumb, dipped into water heated to above a hundred degrees of Farenheit's ſcale, and preſſing it gently, without finding that the adipoſe follicles can by moderate preſſure be emptied or made flat; and globules of oil are not diſtinguiſhable, even with the microſcope, in the liquors taken from the abdomen, joints, and burſæ.

HENCE ſome may perhaps infer, that there are no holes or ducts leading from them of conſiderable ſize. At the ſame time, from the oilineſs which the ſurface of the ſkin, eſpecially in the negro, gets after exerciſe; from finding that the cruſts, procured by evaporating theſe liquors to dryneſs, are inflamable; from the greaſy feel of the omentum, or of the appendices epiploicæ of the colon even in a living animal; from the ſhortneſs of the omentum in man, compared with the great length of it in the quadruped, which we cannot account for in any other way, than that the body of the one animal was intended to be erect, and that of the other horizontal; and, in the laſt place, as we ſcarcely can ſuppoſe that theſe fatty bodies in the joints and burſæ and the omenta, ſerve merely as cuſhions for the defence of the ſecerning veſſels, and therefore cannot point out any other material uſe for the omentum and theſe

(*f*) *See* Tab. IX. fig. 19. 20.

fatty bodies but that of furniſhing an oily matter for the purpoſe of lubricating, I cannot ſee good grounds for doubting that the oil exudes from its follicles through inviſible paſſages into the cavities of the abdomen, joints, and burſæ.

WE next proceed to examine the nature of the fringes or fimbriæ, which we obſerve common to the fatty bodies of the joints and burſæ. Theſe have been very generally ſuppoſed to be the ducts of glands lodged within and protected by the maſſes of fat (*g*). Yet, notwithſtanding the appearance of accuracy in the deſcription given of theſe glands, and the probability that theſe fringes are derived from ſome ſuch origin, and that ſuch bulky maſſes of fat as are found in the knee and in the burſa immediately under it, ſeem, at firſt ſight, to be otherwiſe uſeleſs, I have not been able to diſcover the ſmalleſt veſtige of any knotty, granulous, or glandular body lodged within theſe fatty maſſes in the joints of man or other animals. Nay, although we obſerve ſo many blood-veſſels diſperſed upon the membranes of theſe fatty bodies and upon the fimbriæ, and that we cannot doubt that theſe fimbriæ conſiſt of ducts which contain a lubricating liquor, and that in fact when we preſs upon them we are ſenſible that it iſſues from them; yet their cavities and orifices are ſo minute,

(*g*) Havers, Oſt. Nov. 1691. p. 191. Glandulæ mucilaginoſæ are red, pappy, &c.——Cowper, Expl. of Bidloo, Tab. 79. E. E. Mucilaginous glands of the knee. The ducts of theſe glands form a fringe, &c. ——Morgagni, Adv. II. Illud de ſtructura earundem conglomeratarum ex Cowperi anatomia poteris addere, &c.——Winſlow, Exp. An. 1732. S. 2. 68. Glandes mucilagineuſes ſont grenues, &c. en forme de grains.—184. Sont entrelardées d'une matiere graiſſeuſe—186. On diſtingue facilement la ſubſtance glanduleuſe d'avec l'adipeuſe, &c.——J. Weitbrecht, in Syndeſmolog. calls theſe maſſes Adipoſo-glanduloſas.——Cheſelden, 1740, p. 48. Theſe glands are ſeated in fat.——Haller, El. Phyſ. T. II. p. 366. Ex pinguibus globis, quæ in de articulationibus pariter ut glandulæ reperiuntur.——Plenck, Pr. Lin. Anat. 1775, p. 97. Glandulæ articulares. Sunt parvæ glandulæ, &c.—p. 309. Glandulæ ſynoviales, &c.——Leber, Pr. Anat. 1778. p. 112. Conſtat ſynovia e mucilaginoſo liquore glandularum articularium.——Sabatier, Tr. d'Anat. 1780. T. I. p. 9. Les glandes ſynoviales ſont logées au milieu de maſſes graiſſeuſes et rougeatres, &c.—Leurs canaux excreteurs repreſentent des eſpeces de franges, &c.

that I have not yet been able to get a diſtinct view of them, though I employed magnifying glaſſes (*b*).

THESE fimbriæ ſeem therefore to be ducts like to thoſe of the urethra, which prepare a mucilaginous liquor without the aſſiſtance of any knotty or glandular organ. While by the preſſure which the motion of the joints or tendons makes upon their ſides, they throw out their liquor in greateſt quantity when it is moſt needed, perhaps the ſecretion, as well as excretion, of the liquor, is promoted, as in the ſalivary glands, by motion; and as the extremities of theſe fringes hang looſe into the cavity of the joint, their liquor cannot be preſſed back into them by the motion of the joint.

UPON the whole, the ſynovia ſeems to be furniſhed by inviſible exhalant arteries, by the ducts of the fimbriæ, and by oil exſuding from the adipoſe follicles by paſſages not yet diſcovered. We may ſuppoſe theſe paſſages to be very minute, not only becauſe they are not to be ſeen with the microſcope, but becauſe the oily matter is ſo well incorporated with the mucilaginous as not to be diſtinguiſhable, even with the microſcope, in the form of globules.

As the fat ſeems to be mixed and incorporated with the mucilage in theſe ſacs, it would perhaps be more proper to name them *veſicæ unguinoſæ*, than burſæ mucoſæ.

10. HAVING fully conſidered the ſtructure of the burſæ and ligaments in a ſound ſtate, we ſhall next direct our attention to the effects upon them of uſe, accident, operation, and diſeaſe; by which we ſhall be more fully convinced of the ſameneſs of their ſtructure and properties.

IN old perſons, I have frequently found a hole worn in the membrane of a burſa and ligament which were contiguous, particularly at the joint of the thigh-

(*b*) *See* their ſtructure delineated in Tab. VIII. from fig. 1. to fig. 18.

thigh-bone, by which a communication was opened between the cavity of a burſa and that of the ligament of a joint; yet no complaint of pain or ſtiffneſs of the joint had been made by the perſon during life (*i*). This could not well have happened if the liquor of the burſæ had been eſſentially different from that of the joints.

11. I HAVE repeatedly obſerved an effuſion of fluid into the cavities of the joints and of the burſæ from the ſame cauſes, or in conſequence of the ſame diſeaſes.

THUS, in rheumatic and gouty conſtitutions, the joints are often ſwelled; but when we attend narrowly to the ſeat of ſuch ſwellings, we ſhall generally diſcover an effuſion into the burſæ as well as into the cavities of the joints.

IN like manner, in ſeveral ſcrophulous caſes, I have obſerved the burſæ, eſpecially at the wriſts or ankles, ſtretched with a viſcid fluid.

DROPSY of the joint of the knee, I have remarked, is a more common and a more curable diſorder than I believe it is commonly ſuppoſed to be. I have kept an account of fifteen patients under this complaint, of whom eleven were completely cured by the uſe of leeches, bliſters, and ſolution of ſal plumbi in vinegar, and purgatives. In two more of the number, an effuſion into the joint has continued for ſeveral years. In the two remaining, the effuſion was complicated with white ſwelling, and terminated in death.

IN ſeveral caſes of ſwelling of the knee with fluctuation, I have found that the fluid was lodged in the burſa behind the tendon of the extenſors of the leg; and I have obſerved, that ſuch tumors are apt, with time, to terminate in an imperfect ſuppuration, where ſome purulent matter is mixed with a viſcid clear liquor.

WHEN

(*i*) *See* Tab. VII. fig. 1. 2. 3.

WHEN the tumor of the knee is ſmall, we readily diſcover that the fluid is within the cavity of the joint; by obſerving, that when, after extending the leg in order to relax the tendon and ligament of the knee-pan, we preſs upon the ſoft ſwelling, the knee-pan is lifted up, and the capſular ligament of the knee, under the patella, at the ſides of the ſtrong ligament which ties it to the tibia, is protruded.

12. CARTILAGINOUS bodies have been repeatedly obſerved by ſurgeons within the cavity of the joint of the knee; and a few ſuch have been taken out after cutting into the cavity of the joint (*k*). Of this complaint I have met with various inſtances. In ſome, the cartilaginous ſubſtance was fixed in its place; in others, it ſlipped readily from one place of the cavity of the joint to another. In one caſe, three or four ſuch moveable ſubſtances were diſtinguiſhable: in another, there were upwards of twenty ſuch; three of which, in my poſſeſſion, are delineated in Plate IX. fig. 2. 3. 4. Theſe were ſo compacted within the joint of the knee, that they impreſſed each other nearly in the ſame manner as concretions in the bladders of gall and urine are obſerved to do.

IN like manner, I have ſeveral times obſerved ſmall cartilaginous bodies form within the burſæ of the wriſt after violent ſprains: and in one caſe, which I examined with Mr Kilgour ſurgeon at Ormiſtoun, I found a flat piece of moveable cartilage within the burſa of the glutæus maximus, to which the attention of the patient had been directed by the pain it frequently gave him.

IN another very remarkable caſe, I found upwards of fifty cartilaginous bodies within the burſa mucoſa which is placed behind the tendon of the flexor pollicis

(*k*) *See* fig. 1. and 2. of Tab. IX. which repreſent one ſuch, cut out by Mr F. Dewar ſurgeon in Edinburgh.

pollicis longus (*l*); of which a dozen are repreſented in Tab. IX. (*m*). The diſtention of the burſa by theſe cartilaginous bodies gave ſuch intolerable pain to the patient, that I propoſed to Mr Gibſon ſurgeon in Edinburgh, to puncture the burſa, and to preſs them out at the orifice; which was accordingly done by him.

THE cartilaginous bodies expreſſed from the burſa, not only reſembled thoſe taken from the joints in their conſiſtence, but in their internal ſtructure; both, when cut, ſeeming to be compoſed of lamellæ.

THE manner in which ſuch bodies form within the joints has not been ſatisfactorily explained by authors. Some have ſuppoſed that they were portions of the articulating cartilages beaten off by accident from the bones (*n*): But from the appearance of the cartilaginous bodies extracted from the burſa, one half of which had evidently ſmall ſtalks or peduncles (*o*), and that ſome force was neceſſary to make them move to the place punctured, and that in two caſes I have ſeen of cartilaginous bodies within the knee, in one of which an inciſion was made, theſe bodies were firmly fixed in their place; I apprehend that all grow from or are nouriſhed by peduncles: and it ſeems to me not only highly improbable that they can grow when the peduncle is broken by accident, but in one caſe in which ſuch a cartilaginous body was very moveable, I could not, after two years had elapſed, obſerve any difference either in its ſize or mobility.

13. I WOULD, in the laſt place, obſerve, that the burſæ and ligaments correſpond remarkably in having little ſenſibility in a ſound ſtate of the body, and in acquiring a great degree of ſenſibility by inflammation (*p*).

(*l*) *See* Tab. I. 1.

(*m*) *See* Tab. IX. from fig. 7. to fig. 18.

(*n*) Med. Eſſ. of Edin. Vol. IV. Art. XIX.—Reimarus de Furgo Articul. p. 32.

(*o*) *See* Tab. IX. fig. 7. 8. 9. 13.

(*p*) The nerves of the ligaments of moſt joints are ſo minute that they cannot be traced by diſ-

ſection;

THAT ligaments in a ſound ſtate have little ſenſibility, appears in the firſt place from the inconſiderable pain which often attends the luxation of bones. In which caſe, however, it may be proved, from a variety of circumſtances, that the ligaments are lacerated; but particularly becauſe I found, by various experiments which I made on the human body ſo long ago as the year 1754, and mentioned ſince that time in my lectures, that it is impoſſible, even in children, to diſlocate the humerus, which is looſely articulated, without laceration of its capſular ligament, although the joint be previouſly relaxed by ſoaking it in tepid water.

THIS fact of the ſmall ſenſibility of ligaments is ſtill more clearly proved by the experiments of Dr Haller; who, in living animals, not only punctured the ligaments, but after doing ſo poured oil of vitriol and other cauſtic ſubſtances into the cavities of the joints, without giving ſuch pain to the animals as produced a ſenſible expreſſion of it. To which we may add, that in a few operations in which, after extracting cartilaginous bodies from the cavity of the joint of the knee, the member was kept at reſt and the wound carefully dreſſed, the wound cloſed without giving pain (*q*).

ON the other hand, we may not only obſerve violent pain produced in the joints, by white ſwelling, gout, and rheumatiſm, but where wounds have accidentally penetrated into the cavities of the joints, or been made with the intention of evacuating water, or of extracting ſuch cartilaginous bodies, if the wound has not been properly cloſed, and the joint reſtrained from motion, a very conſiderable and painful ſwelling of the whole joint has enſued; which in

ſection; but in ſome few places nerves can be traced into ligaments, and particularly at the back part of the wriſt, I find in all ſubjects a nerve adhering to the outer ſide of the ligament, which I have delineated in Tab. XXVI. of my work on the Structure and Functions of the Nervous Syſtem.

(*q*) *See* Pechlin Obſ. Ph. Med.——Dr D. Monro on Dropſy, p. 170.——Two cartilaginous bodies, one of which is in my poſſeſſion, and delineated in Tab. IX. fig. 1. and 2. were cut at different times, to wit, in 17 and 1778, from the joint of the ſame knee, by Mr W. Inglis and Mr F. Dewar, ſurgeons in Edinburgh.

in ſome caſes has terminated fatally, or, to ſave life, there has been a neceſſity of having recourſe to the amputation of the limb (*r*).

THE burſæ, in the ſame way, have been unavoidably cut in many of the experiments of Dr Haller and others on the tendons, and have appeared to be inſenſible. In ſome diſeaſes, likewiſe, particularly in ſcrophula, I have obſerved them ſwelled without conſiderable pain. In other diſeaſes, as in rheumatiſm, where greater inflammation is excited, we may frequently obſerve the burſæ at the wriſts and ankles ſwelled with great pain; which is increaſed by preſſing on theſe parts without bending the joints.

IN the caſe I have deſcribed, where many cartilaginous bodies were found within the burſa of the flexor pollicis longus, when the burſa came to be much ſtretched, and probably ſlightly inflamed, the patient felt conſiderable pain when preſſure was made on it; juſt as in the caſe of moveable cartilage within the knee, pain is often felt when the cartilage is lodged in certain places of the cavity of the joint. Generally the patient is eaſieſt when the cartilage can be felt at the ſides of the joint; but in ſome caſes, as in one I heard mentioned by Mr Middleton in 1756, he is eaſieſt when the cartilage is lodged under the patella and kept from getting out of that ſituation by a bandage.

AFTER extracting the cartilaginous bodies from the burſa, a very ſmall ſeton was paſſed through it; as we took for granted, that if the puncture was allowed to cloſe, the burſa would ſoon be again diſtended with fluid. The patient complained little in the time of paſſing the ſeton; but three days thereafter we were obliged to withdraw it, on account of a violent inflammation; which, however, had the effect of creating the union of the oppoſite ſides of the burſa, and thereby accompliſhing a cure.

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(*r*) *See* Med. Eſſ. Vol. IV. Art. XX.——Reimarus De Fungo Articul. p. 15. 16.——Dr D. Monro on the Dropſy, p. 170.

In the courſe of the preſent year 1786, I was conſulted by two patients with a conſiderable collection of ſynovia within the burſa which is behind the inſertion of the extenſors of the leg into the patella.

In both, after the application of diſcuſſing liquors and of bliſters had been tried in vain, the liquor was drawn off by a lancet-ſhaped trocar paſſed obliquely, with the view of excluding the air.

It may be worth while to remark, that the liquor brought to a boiling heat was found to contain much more coagulable matter than the ſynovia does in a ſound ſtate. In one caſe, the operation was palliative only, and was not followed with inflammation or pain: but in the other caſe, the whole knee inflamed violently, and ſuppurated, probably from the reſtleſſneſs of the patient and admiſſion of the air; ſo that the amputation of the limb became unavoidable.

It is therefore evident, that the burſæ and capſular ligaments of the joints reſemble each other in their ſenſibility, as well as in their ſtructure otherwiſe, and in their diſeaſes.

SECT. VIII.

SECT. VIII.

COMPARISON *of the* STRUCTURE *of the* BURSÆ *with that of the* PLEURÆ, PERICARDIUM, *and* PERITONÆUM.

WE may perhaps venture a ſtep farther, and remark, that the pericardium, the pleuræ, and the peritonæum, have the adipoſe ſubſtance connected to them; and that the fat in the doublings of theſe membranes ſeems to be collected for ſpecial purpoſes; as at the apex of the heart, in the omenta, and appendices pinguedinoſæ of the colon: But we do not find, as within the capſular ligaments and burſæ, that fimbriæ or fringes, ſuch as in the joints have been ſuppoſed to be the ducts of glands, project from the membranes which cover the fat; and fewer veſſels conveying red blood are diſperſed in the cellular ſubſtance between the fat and theſe membranes. Hence the liquor ſecreted into the joints and burſæ probably differs ſomewhat from that poured into the cavities of the thorax and abdomen.

THERE is, however, a conſiderable reſemblance of ſtructure. And, in farther proof of this, I found in one caſe of hydrocele of the vaginal coat of the teſticle, for which I attended an operation performed by Mr Alexander Wood, four ſmall cartilaginous bodies within the vaginal coat; one of which adhered ſlightly to the epidydimis; the other three ſeemed to be looſe, and floated in the liquor, but perhaps were rubbed off from the inner ſide of the ſac (*s*) in time of the operation.

(*s*) *See* Tab. IX. fig. 19. 20. 21. 22. 23.

WOUNDS of theſe large ſacs of the thorax and abdomen likewiſe generally produce a high degree of inflammation, attended with the moſt dangerous conſequences.

As I apprehend that the danger may be in a great meaſure prevented by determining the cauſe of it, I ſhall treat of this at ſome length in the following ſection.

SECT. IX.

SECT. IX.

Of the CAUSE *of the* DANGEROUS INFLAMMATION *which generally follows the* WOUND *of a* SHUT SAC, *and of the* MANNER *of* PREVENTING *it.*

FROM conſidering the much greater degree of inflammation, pain, and danger, which attend compound than ſimple fracture and luxation, and the ſeveral facts above ſtated, with the danger which attends wounds penetrating into the cavities of the head, cheſt, or belly, it has always appeared to me, that the bad ſymptoms were much more owing to the admiſſion of the air than to the mere diviſion of the ſolid or membranous parts. And in this opinion I was much confirmed by a great number of experiments I made on living animals at different times, and particularly in the year 1771; in which, with various views, I laid open the cavities of the thorax and abdomen: For in theſe I found that the danger was not proportioned to the ſize of the wound inflicted, but to the time and manner in which the bowels were expoſed to the air. I have therefore always inculcated in my lectures, but more eſpecially ſince that period, the advantages which would attend the excluſion of the air from the deep receſſes of the body in performing different operations, and in treating wounds accidentally inflicted.

(A.) In the caſe, therefore, of cutting into the knee-joint for the purpoſe of extracting ſuch cartilaginous bodies as have been deſcribed, I have always propoſed an advice, which I would anxiouſly recommend, by having heard of and witneſſed more than one inſtance of bad effects when it was not attended to, I mean the drawing up the ſkin as much as poſſible before the inciſion is made, and, as ſoon as the cartilaginous body is extracted, covering the wound in the ligament, by letting the ſkin fall down to its natural place, and

by

by proper dreſſings; at the ſame time keeping the joint at reſt, and purſuing the antiphlogiſtic courſe.

(B.) In the operation of the trepan, I have adviſed that the cranium ſhould not be entirely cut with the ſaw, but that the operator ſhould deſiſt from ſawing when the innermoſt lamella becomes ſo thin that it can be eaſily broken off with a levator or forceps; by which we not only avoid the danger of the inſtrument preſſing rudely on the brain, but alſo, in many caſes, the cutting of the dura mater, and admiſſion of the air to the ſurface of the brain; which, in experiments I made on half a dozen pigs near thirty years ago, I found increaſed the danger conſiderably.

(C.) In the caſe of air effuſed into the cavity of the pleura, for which, ſo far back as 1758, I ventured to propoſe the paracenteſis of the thorax, I have adviſed that the operation ſhould be performed with a ſmall trocar paſſed cautiouſly in a ſlanting direction; and, after withdrawing the ſtilette, and letting out the effuſed air, that a flexible canula, with a plug fitted to it, ſhould be introduced, in order to preſerve an outlet to the air till the wound of the lungs be cloſed; and that, before withdrawing the canula, any air remaining in the pleura ſhall be ſucked out with a ſyringe or elaſtic bottle. And in 1769 a caſe occurred, in which, by my direction, that operation was performed nearly in this manner with relief and ſucceſs (*t*).

Inſtead of the cautious method above mentioned, Mr Hewſon (*u*), and others following him, have propoſed an inciſion by a knife; which I have found, even in experiments on ſound animals, generally proves fatal, from the violent degree of inflammation which the free admiſſion of the cold air creates. In one experiment on a pig, the inflammation from the admiſſion of air by a ſmall inciſion

(*t*) *See* an account of this caſe communicated by Mr Kellie, one of the ſurgeons preſent, to Dr Duncan, and publiſhed by him in his Medical Commentaries, Vol. II. p. 427.

(*u*) Med. Obſerv. London 1767, p. 396.

incision was so violent as to kill the animal, after producing an adhesion of the lungs with the upper part of the pleura, in the space of thirty-six hours.

(D.) The danger of the admission of air to the cavity of the pericardium and surface of the heart is proved by the following very singular case, which occurred to me about six years ago. Two men in liquor, disputing about their skill in fencing, the one challenged the other to a match with pokers heated at the points, that there might be no mistake about the hits; and his challenge was accepted. One of them received a thrust under the cartilage of the fourth rib of the right side, about a finger-breadth from the edge of the sternum, in a slanting direction inwards. He complained little till the third day after the accident, when symptoms of deep-seated inflammation began to appear, and, notwithstanding blooding and other remedies, continued to increase. These, on the tenth day thereafter, when I was called to him, were succeeded by rigor and coldness of the extremities, with a small, frequent, and intermitting, pulse; and two days thereafter he died. On opening his body, a slanting passage was discovered on the outside of the pleura into the mediastinum and cavity of the pericardium; in which last about five ounces of purulent matter were found. The internal part of the pericardium, and the whole surface of the heart, were much inflamed; but there was no mark of injury done to the heart by the point of the poker: and it appeared to me evident, that the fatal symptoms had been chiefly produced by the air entering the pericardium in the time of inspiration.

(E.) The abdominal viscera, I have already observed, are dangerously affected by the air of the atmosphere admitted through wounds. But I have met with three cases in which the air escaped from the alimentary canal into the cavity of the peritoneum, and occasioned a true tympany, attended with such a degree of inflammation, as occasioned, in a few days, slight adhesion of the different parts of the intestines with each other and with the peritoneum, and no doubt contributed much, with other complaints, to the death of the patients. In the first of these cases, to which I was called by the late Dr D.

Clark and Mr Adie ſurgeon, about twenty years ago, the arch of the colon had been eroded after a tedious dyſentery (*x*). In the ſecond caſe, two holes were formed in the jejunum by two pins, with their points turned different ways, and tied together with a thread, which had been accidentally ſwallowed (*y*). In the third caſe, of a perſon in a typhus, the colon ſeemed to have burſt during the operation of an emetic.

IN the firſt of theſe caſes, in which the belly was enormouſly diſtended, I prevailed with Mr Adie ſurgeon to let off the air with a trocar, which relieved the patient much; but as the hole in the colon was large, the abdomen ſoon filled again with air, and the patient died in a few days thereafter.

(F.) IF a large opening has by accident been made into a cavity, or is unavoidable from the nature of an operation, ſuch as the Cæſarean ſection of the uterus, I uſed to remark the neceſſity of excluding, as much as poſſible, the acceſs of the air during the chirurgical operation, and afterwards by ſtitching the wound far more accurately than has been practiſed by ſurgeons (*z*).

(G.) THERE likewiſe ſeems to me to be ſtrong reaſon for ſuppoſing that the danger, not only in the high but in the lateral operation of lithotomy, may be leſſened by the ſurgeon uſing every means to exclude the air from the wound and bladder during theſe operations, and by ſtitching the teguments after the high operation.

THE late celebrated Mr Smith ſurgeon in Perth loſt, as appears by a copy of his manuſcript in my poſſeſſion, eight of eighteen patients on whom he performed the high operation: and I have obſerved, that thoſe patients generally died, or were in great danger, where the preſence of a number of ſmall ſtones rendered

(*x*) *See* Tab. X. fig. 1.

(*y*) *See* Tab. X. fig. 2. 3. 4. 5.

(*z*) *See* an extract from my lectures on this ſubject, publiſhed by Dr Alexander Hamilton profeſſor of midwifery, in his Outlines of Midwifery, from p. 345 to p. 352.

dered the operation tedious, from the neceſſity of introducing the forceps repeatedly.

(H.) WITH ſimilar views I have long ventured to propoſe a method of operating in hernia, which I am perſuaded, from a moſt ſucceſsful trial of it in different caſes, as well as from reaſon and analogy, would render this frequent and very neceſſary operation far leſs dangerous than it has hitherto proved in the hands of the moſt experienced and dexterous ſurgeons. And as this is a ſubject of the utmoſt importance, I ſhall ſtate it more fully than is perhaps neceſſary for illuſtrating the chief ſubject of this work.

THAT I may give a fair repreſentation of the opinion and practice of the preſent moſt eminent ſurgeons, I ſhall quote the following paſſages from the works of one of the lateſt and moſt juſtly celebrated authors in ſurgery, I mean Mr Pott (*a*).

IN the firſt place, he tells us (p. 286), " Theſe are my principal reaſons for " believing that the mere ſtricture made by the tendon is, in the generality " of incarcerated ruptures, not only a ſufficient, but the primary and indeed " the ſole cauſe of the ſymptoms, and of all the miſchief."

WHEN, after bleeding, glyſters, &c. preſſure, poſture, and agitation of the patient's body, are found to be inſufficient for the reduction of the bowels, recourſe is had to the operation; which is directed to be done in the following manner: " An inciſion muſt be made through the ſkin and membrana adipo- " ſa, beginning juſt above the place where the inteſtine paſſes out from the " belly, and continuing it quite down to the lower part of the ſcrotum---The " place to make the inciſion in the hernial ſac is about an inch and a half be- " low the ſtricture, and the opening need not be larger than to admit the end " of the operator's finger---With the knife on the finger the ſac muſt be di- " vided quite up to the opening in the tendon, and down to the bottom of

" the

(*a*) Pott's works in 4to, 1775.

" the ſcrotum---The ſac being laid open, the inteſtine generally puſhes out " immediately---This is the time to try whether, by gently drawing out a " little more of the gut, its bulk cannot be ſo reduced as to enable the ſur- " geon to return it back into the belly without dividing the tendon---Yet if " it (the reduction) cannot be very eaſily accompliſhed without the diviſion " of the tendon, it had better not be attempted---The ſac and ſtricture being " divided, the contained parts come into view---In returning the inteſtine, " care ſhould be taken to put in that part firſt which came out laſt, &c. A " conſiderable part of the hernial ſac, if large, thick, and hard, may very " ſafely and properly be removed---An old rupture which was originally con- " genial is ſubject to a ſtricture made by the ſac itſelf, independent of the " abdominal tendon, as well as to that made by the ſaid tendon. And in this " kind of hernia I have more frequently found adheſions of the parts with " each other, of the inteſtine with the teſticle (*b*)." Stitching up the wound is not directed to be done by Mr Pott; and ſome late writers tell us it ought never to be attempted.

AFTER obſerving the ſteps directed to be taken in the operation, let us conſider the degree of danger which attends the operation, and the chief cauſe or cauſes of that danger; by which we ſhall be led to the way of avoiding them.

IT is not only true that a great proportion, in general, of thoſe on whom the operation for hernia has been performed, dies; but it muſt be acknowledged, that many die on whom the operation has been done early, before ſymptoms of violent inflammation bordering on mortification have appeared. Nay, Mr Sharp tells us, " That he has ſeen two or three patients, " who were in every reſpect hale and ſtrong, and who ſubmitted to the ope- " ration merely to get rid of an inconvenience, die a few days after the " operation;" and adds, " that the event, though very ſurpriſing, ſhould be a " leſſon never to recommend this method of treating an epiplocele, unleſs

" it

(*b*) *See* Mr Pott's works in 4to, 1775, pages 286, 278, 279, 280, 289, 290, 312.

" it is attended with inflammation," &c. (*c*). The ſame thing has occurred to other eminent ſurgeons (*d*). To which the reader will pleaſe to add what was before obſerved, that if wounds be made into the abdomen of ſound animals, and that a portion of the alimentary canal, as large as that which is often contained in a herniary ſac, be handled and expoſed to the air, the animals frequently die.

THAT the wound of the tendon or peritonæum contributes little or nothing to the fatal event, appears clearly from the following circumſtances.

IN the firſt place, I might with great propriety quote the numerous experiments of Dr Haller and others, who have found that tendons may be wounded without pain or material bad conſequences. But without dwelling on theſe experiments, I have in ſeveral caſes directed the aponeuroſis of the human temporal muſcle to be cut largely in fractures of the cranium; I have directed an inciſion to be made in the apaneuroſis of the biceps flexor cubiti, for the diſcharge of fetid matter confined by it; I have ſeen it repeatedly divided in the operation for aneuriſm; I have in many living animals cut the linea alba and the peritonæum freely; I have in two caſes of bubonocele cut freely the tendon of the ring of the external oblique; and in two caſes of crural hernia, divided with like freedom the tendon of the external oblique, called Ligament of Fallopius. In two of theſe caſes, the peritonæum, which was thickened, and formed a ſtricture at the neck of the ſac, was divided; yet all theſe inciſions were performed without producing any dangerous conſequences. In like manner, I have ſeen the vaginal coat of the teſticle laid open by inciſion; but the dreſſings having ſlipped from between the lips of the inciſion, theſe grew together without producing ſuch a degree of inflammation as ſeemed neceſſary to effectuate a cure, ſo that there was a neceſſity of tearing them aſunder to introduce dreſſings and to admit the air.

(*c*) *See* Sharp Op. of Surg. 1761, p. 28.

(*d*) J. L. Petit Tr. des Mal. Chir. 1774, T. 2. p. 354. &c.

WE may therefore conclude, without a doubt, that the danger of the operation of hernia is not owing to the mere diviſion of the tendon or of the peritonæum; but that it depends chiefly, and almoſt ſolely, on the handling of the bowels, and the expoſure of theſe and of the inner ſide of the ſac to the air: Nay, in ſome caſes where the operation of the hernia had proved fatal, I obſerved, on opening the abdomen, that portions of the inteſtine, and likewiſe of the peritonæum, at a diſtance from the herniary ſac, were much inflamed, although the patient had not before the operation complained of pain, except at the place of the rupture.

WHEN we now review the opinion and the practice of ſurgeons, we ſhall perhaps find they are not a little inconſiſtent with each other: for "if the "mere ſtricture made by the tendon is, in the generality of incarcerated rup-"tures, not only a ſufficient, but the primary and indeed the ſole cauſe of the "ſymptoms, and of all the miſchief," why, after the ſkin is divided, do ſurgeons firſt lay open the herniary ſac its whole length, and then cut the tendon; inſtead of merely cutting the ſtricture made by the tendon, without opening the ſac, and then reducing the bowels by preſſure, poſture, and agitation, if the latter ſhould ever be neceſſary?

THEY pretend indeed to aſſign as reaſons for their practice, that unleſs the ſac is laid open, we cannot know in what ſtate the bowels are; that the inteſtines or omentum are liable to mortification; that collections of fetid water are apt to occur, which, on being puſhed back into the abdomen, might be productive of miſchief; that ſometimes the cauſe of ſtrangulation has been detected either in the entrance to the ſac or among the bowels protruded; or they tell us there are adheſions of the bowels to the inner ſide of the ſac, which ought to be ſeparated.

BUT ſuch kind of reaſoning, if it has weight, goes farther than is intended; for it ought to prevent ſurgeons from attempting in any caſe, at leaſt from attempting in moſt caſes, the reduction of a hernia.

YET

YET nothing is more common than to ſee ſurgeons doing every thing in their power to reduce a hernia; and in a few minutes or hours thereafter, inſtead of taking off the ſtricture by cutting the tendon, laying open the herniary ſac, as if the reduction of the bowels would otherwiſe have been unſafe. Surely no reaſon can be given why the reduction of the bowels ſhould be ſafe before the tendon is cut, but unſafe after it is cut.

BUT inſtead of uſing this kind of *argumentum ad hominem*, as it is called, I would obſerve farther, that it ſo very ſeldom happens that one part of the inteſtine is twiſted around another, or the omentum around the inteſtine, ſo as to ſtrangulate it, that we find only a very few ſuch caſes mentioned in the whole hiſtory of ſurgery. And if even we were to ſuppoſe ſuch a caſe of twiſting or volvulus, if the hernia had not continued ſo long as to produce an accretion of the bowels, the effect of the twiſting and preſſure would probably be taken off by puſhing the bowels back into their natural place in the large cavity of the abdomen. As for the fetid water, which it is ſaid is apt to occur, and that the puſhing it back into the abdomen might be productive of miſchief; from what I have obſerved in the operation of hernia, I am very doubtful whether fetid water is ever produced except where there is mortification. Water is indeed often effuſed in a ſtrangulated hernia; but if there is no mortification, and the hernia be reduced, that water produces no bad ſymptom, but is ſoon abſorbed. If this was not the caſe, the reduction of every hernia which had been for a ſhort time ſtrangulated would be attended with danger.

WE are by this obſervation led to conſider the treatment in mortification.

IF it be certain that the bowels are mortified, the neceſſity of opening the ſac is evident, that we may give our patient a chance of life, though to be attended with moſt uncomfortable circumſtances: But if there be the ſmalleſt chance that the inflammation may terminate without mortification, it is equal-

ly

ly certain that nothing can be ſo pernicious as opening the ſac, and that the bowels ought to be returned without expoſing them to the air.

To make this more evident, I ſhall ſuppoſe that the bowels cannot be reduced by taxis, or that the operation is neceſſary in two hundred patients; and that in one fourth part of the number the bowels are ſo much ſtrangulated and inflamed that the termination in a mortification could not by any means be prevented, but that in the other three fourths there is a probable chance that the inflammation may be diſperſed.

IF the operation be done in all theſe caſes by opening the ſac, it is probable that of the firſt fifty we may ſave one or two in all; and of the other hundred and fifty, thirty or forty at the utmoſt. Whereas, if we ſuppoſe that in all theſe patients the ſkin and tendon only are divided, and the bowels reduced without opening the ſac, we ſhould indeed loſe all thoſe in whom the mortification was complete: but I am well convinced we ſhould not loſe above ten or twenty at moſt of the other hundred and fifty; and that, upon the whole, many more lives would be ſaved.

AFTER having reaſoned in this manner upon the ſubject for ſeveral years, I determined to put this method of operating to the trial, and have accordingly directed it to be practiſed in four caſes; in all of which the patient ſeemed to be in great danger, and yet every one of them recovered without a ſingle bad ſymptom in conſequence of the operation.

IN 1770 I was called, along with Mr Alexander Wood, to a caſe of crural hernia in a woman thirty-five years of age, with ſymptoms of ſtrangulation which had continued three days. Finding it impoſſible to reduce it, I prevailed with Mr Wood to cut the tendon without opening the ſac, and then to attempt the reduction; which we executed with the utmoſt eaſe.

IN

IN 1774, in a caſe of hernia congenita, to which I was called by Mr Clarkſon ſurgeon at Dalkeith, we found the neck of the ſac as well as the tendon of the oblique muſcle extremely conſtricted. After cutting the ſkin and tendon, we with much difficulty divided the ſtricture at the neck of the ſac; and, having reduced the bowels, we ſtitched the teguments.

IN the end of 1781, I was called by Mr Arrot ſurgeon in Edinburgh to a gentleman conſiderably above ſixty years of age, who had been long ſubject to a large hernia, which had been ſtrangulated for ſeveral days. All the common means of cure having proved ineffectual, I propoſed the inciſion of the tendon, which was very eaſily executed; and after that all the bowels were readily returned into the abdomen, except a portion which ſeemed to grow firmly to the inner ſide of the ſac. All the bad ſymptoms diſappeared; and the inciſion, the ſides of which were ſupported by ſtitches, cloſed like a common wound of the teguments.

IN 1782, I was called by Mr Simſon and Mr Calderwood ſurgeons in Dalkeith to a caſe of crural hernia, which had been ſtrangulated more than two days, in a woman thirty-five years of age. I directed the tendon to be cut; but ſtill finding reſiſtance from a ſtraitneſs and thickening of the neck of the ſac, we made a ſmall perforation in the peritonæum above the ſtricture, and introducing a probe bent ſemicircularly at its point cut the neck of the ſac upon it. We then eaſily reduced a ſmall portion of the ilium which was ſtrangulated, and ſtitched the wound accurately. Six days thereafter I received from Mr Calderwood the following letter:

"SIR,

"I HAVE the pleaſure to inform you that our patient at Dalhouſie pro-
"miſes a favourable recovery. She has had regular and free paſſage twice
"a-day. The pain in her belly is quite gone. She has had hardly any de-
"gree of fever; and the wound diſcharges good matter. I am convinced

" the ſtitching, beſide leſſening the danger, will contribute very much to a " ſpeedy recovery.

I am, &c.

DALKEITH, Nov. 8. 1782. R. CALDERWOOD."

THIS patient, and, ſo far as I know, all the others, are ſtill alive and well.

WE are told, in the laſt place, that the ſac ought to be laid open, in order that the ſurgeon may ſeparate any adheſions the bowels may have contracted.

FOR my own part, I am much inclined to believe, that, in the caſe of adheſion, the ſafeſt and beſt general rule will be, to take off the ſtricture by cutting the tendon, without expoſing the patient to the imminent danger of opening the ſac, to be heightened by the time which muſt be neceſſary for the ſeparation of the adheſions.

BUT if, inſtead of this, the reader ſhall, upon the authority of Mr Pott, judge it adviſable in all caſes to attempt the ſeparation of adhering parts (*e*), it will ſurely be time enough to open the ſac after we have taken off the ſtricture by cutting the tendon, and found that the bowels cannot be reduced by preſſure becauſe they adhere to the inner ſide of the ſac.

THE rule of opening the ſac after dividing the ſkin, ſeems to have been introduced becauſe ſurgeons ſuppoſed the mere inciſion of the tendinous parts conſtituted a principal part of the danger of the operation; and that they were by no means aware that the danger proceeded chiefly and almoſt entirely from the expoſure of the bowels to the air: And this practice has

(*e*) Mr Pott, p. 291. ſays, " I have ſeen the inteſtines very firmly adherent to each other, to the " ſac, to the omentum, and to the teſticle; but never in ſuch a ſtate of adheſion as to be inca- " pable of being returned."

has of late been tranſmitted from one author to another, from a want of due attention and reflection (*f*).

UPON the whole, I have no doubt that many lives may be ſaved by adopting the following rules in the operation for hernia.

IF the ſurgeon is not called till the bowels are evidently in a ſtate of mortification, the method recommended by authors is to be followed.

BUT if he is called in proper time, after trying in vain the ordinary method of reducing the bowels, he ought to operate more early than is commonly done, or before the inflammation can have produced adheſion; in which caſe the operation, after dividing the ſkin, ſhould conſiſt merely in the taking off the ſtricture by cutting the tendon. In this caſe, after the ſkin oppoſite to the ring is cut, the ſtricture is to be taken off by dividing the tendon; after which the bowels may, by gentle preſſure, be returned into the abdomen, without any danger of their ſuffering by being twiſted; and the inflammation which follows the diviſion of the tendon, eſpecially if the ſides of the inciſion in

(*f*) The ingenious M. J. L. Petit propoſed many years ago to avoid opening the ſac in the operation for certain caſes in ſtrangulated hernia, as appears by a poſthumous work of his printed at Paris in 1774, in three volumes, De Malad. Chirurg. It has been reported that he afterwards relinquiſhed this method, and "joined keenly with thoſe who had oppoſed it;" but I find no proof of this in his poſthumous work. But if we attend to his reaſoning upon it in Tom. II. p. 356, where he lays down the following propoſition, which not only appears at firſt ſight paradoxical, but which cannot be founded on proper facts, and leads him, in p. 359, to a moſt dangerous and falſe concluſion, "Qu'il eſt bon, pour reuſſir, que les parties aient été quelque tems à la gene," to wit, "Que ces operations faites aux hernies ſans etranglement, n'ont pas des ſuites ſi heureuſes, que celles, qui ſont faites aux hernies qui ſont etranglées;" we will readily perceive that Mr Petit did not perceive the chief advantages of the operation he propoſed; I mean, that the danger in the common method of operating ariſes chiefly from the expoſure of the bowels to the air: and as this material fact has been little better underſtood by various authors who have lately wrote on the ſubject, that method has been rejected by them on as ſlight foundation as that on which it was propoſed by Mr Petit.

in the ſkin be joined by ſtitches, will ſcarcely be greater than where the ſkin alone is divided.

By the by, I would here obſerve, that the diviſion of the tendon in the crural hernia is not attended with that degree of danger which ſome of the lateſt and moſt eminent writers have ſuppoſed (*g*), providing the edge of the knife be turned towards the umbilicus; in which direction both the epigaſtric artery and ſpermatic cord are at the greateſt diſtance from it; and that the knife be uſed like a ſaw, dividing cautiouſly with it one tendinous faſciculus after another.

If, after dividing the tendon, the bowels cannot be eaſily returned into the abdomen, there may be room for ſuſpecting that they are confined by a ſtricture of the neck of the ſac, eſpecially in the hernia congenita; which muſt therefore be in the next place removed.

If the herniary ſac under the ſtraitened place of its neck be thin and tranſparent, and that there is little or no reaſon to ſuſpect an adheſion of the bowels with the ſac, the beſt method will be to make a ſmall hole in the ſac below the ſtricture, and then to introduce a ſmall furrowed probe, and to cut cautiouſly upon it: But if the ſac be thick and dark coloured, and that there is likewiſe a ſuſpicion that the bowels may adhere to it, the eaſieſt and ſafeſt manner will be to make the hole in the peritonæum above the ſtricture; then to introduce a common probe, bent near its point into a ſemicircle; and to introduce this, with its point directed downwards, through the ſtricture into the ſac; and, upon the point of it, to make with great caution another ſmall hole; after which we may either cut upon the probe, or introduce a furrowed probe, and divide the neck of the ſac (*h*).

After

(*g*) Pott, p. 308.

(*h*) In a caſe of crural hernia to which I was called along with Mr Dewar ſurgeon, in 1772, the ſac was thick and opake, with a ſuſpicion of adheſion; for which I propoſed this method; and we executed

AFTER this the bowels are to be returned by preſſure upon the ſac, without opening it farther; and the wound in the ſkin is to be ſtitched ſo accurately, by paſſing the ſtitches about the breadth of the finger from each other, as to prevent the acceſs of the air. The wound in the ſkin ought likewiſe to be dreſſed with large pieces of lint ſpread with ſimple cerate, and theſe ſhould be covered with a compreſs.

IN the hernia congenita, where the bowels are in the ſame ſac with the teſticle, it is ſtill more neceſſary than in the moſt common kind of hernia to avoid opening the herniary ſac, as the inflammation of the teſticle would add conſiderably to the danger.

IN the caſe of hernia congenita, which I treated along with Mr Clarkſon in 1774, the teſticle, which before the operation had been in a great meaſure concealed by the bowels deſcending to the bottom of the ſcrotum, was not ſo much inflamed during the cure as to be ſenſibly enlarged.

BEFORE I conclude, I cannot help taking notice of a want of accuracy in the late writers as to the manner of diſtinguiſhing the hernia congenita. Mr Pott, p. 311. ſays, "The appearance of a hernia in very early infancy, will "always make it probable that it is of this kind; but in an adult, there is "no reaſon for ſuppoſing his rupture to be of this ſort but his having been "afflicted with it from his infancy. There is no external mark or character "whereby it can be certainly diſtinguiſhed from one contained in a common "hernial ſac; neither would it be of any material uſe in practice if there "was."

executed it with little difficulty. It was likewiſe eaſily done in the operation I attended in 1782 with Mr Simpſon and Mr Calderwood, and very lately in a caſe I attended with Dr Alexander Hamilton and Mr Andrew Wood ſurgeon.

INSTEAD of which, I would obſerve, 1. That a hernia that is not congenite may have continued from early infancy. 2. That a congenite hernia may be diſtinguiſhed in an adult by an evident external mark; which is, that the bowels puſh down between the ſac and the forepart and ſides of the teſticle, ſo as often, in a great meaſure, to conceal it; whereas, in the common hernia, every part of the teſticle can be felt diſtinctly. 3. I would allege that it is of material uſe to make the diſtinction; becauſe in whatever manner we operate in the hernia congenita, unleſs we take the utmoſt care to exclude the air, there will be a more violent inflammation and greater diſtreſs than in common caſes, becauſe the teſticle will partake of the inflammation.

SECT.

TAB. VIII.

Fig. 1.

Fig. 2.

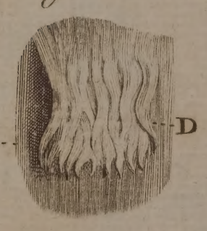

Fig. 6.

Fig. 5.

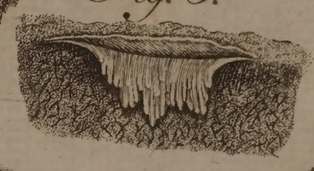

Fig. 4.

Fig. 8.

Fig. 7.

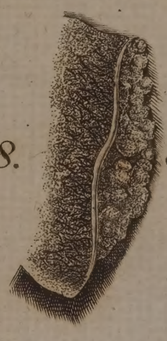

Fig. 3.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 14.

Fig. 13.

Fig. 15.

Fig. 18.

Fig. 17.

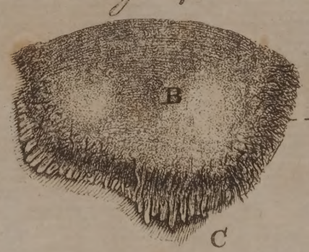

Fig. 16.

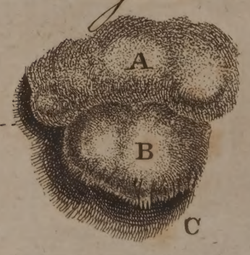

Fig. 19.

Fig. 20.

MANCHESTER
INFIRMARY

Tho.s Donaldson delt.

Geo.s Cameron sculp

SECT X.

EXPLANATION OF TABLE VIII.

IN this Table the Structure is represented of the Fat and of the Organs, called Mucilaginous Glands, which secrete the Liquor of the Joints or Synovia, and the Liquor which lubricates the Bursæ Mucosæ.

FIG. I.

A. The head of the os humeri.

B B. The cut edge of the capsular ligament.

C. A fimbriated organ, which in

FIG. II.

Is represented magnified.

FIG. III.

THE Secerning or Glandular Organ, which fills the Bottom of the Acetabulum, is here represented.

A. Part of the round ligament of the thigh-bone.

B. The middle part of the glandular organ covered with a vascular membrane.

C. A small hard body, fixed by a peduncle, found in this subject.

D E. Fimbriæ projecting from the edge of the glandular body.

IN

IN FIG IV.

THE Fimbriæ D are repreſented as they appear when viewed with a magnifying Glaſs.

FIG. V. AND VI.

REPRESENT Fringes hanging from the ſame Glandular Organ of another Subject, of the real Size, and magnified.

FIG. VII.

REPRESENTS a perpendicular Section of the ſame Glandular Subſtance: And,

FIG. VIII.

REPRESENTS that Part of it which was connected to, and cut away from, the Bone. In both Sections, Fat with Veſſels appears; but no red or knotty Bodies were found intermixed with the Fat.

FIG. IX.

A B. The inner or back part of the patella.

C D E F. *Pelotons* of fat with fimbriæ, which are placed around the patella.

FIG. X. XI. XII.

REPRESENT the Fimbriæ delineated in Fig. IX. viewed with a magnifying glaſs.

FIG. XIII. XIV. XV.

REPRESENT the ſame kind of Fimbriæ in another ſubject.

FIG.

FIG XVI.

REPRESENTS, of the natural Size, the fatty ſecerning Organ cut out from the Burſa between the Tendo Achillis and Os Calcis.

A. The root of the fatty ſubſtance.

B C. The fatty ſubſtance which projects into the burſa with its fimbriæ.

FIG. XVII.

REPRESENTS B C of laſt Fig. magnified.

FIG. XVIII.

REPRESENTS that Part of this fatty Subſtance which was connected to the Heel Bone. In it no red or knotty glandular Bodies, different from Fat, were diſtinguiſhable.

FIG. XIX.

REPRESENTS a ſmall Portion of the ſubcutaneous Fat of the Human Body viewed with a Microſcope, which increaſes its Diameter about thirty Times: And,

FIG. XX.

REPRESENTS the ſame viewed through a compound Microſcope, which magnifies it to near one hundred and fifty Diameters.

THE oily matter is found to be contained in ſpherical or ſpheroidal ſhut ſacs or follicles.

SECT. XI.

EXPLANATION OF TABLE IX.

THE ſeveral Figures of this Table repreſent hard, elaſtic, cartilaginous Bodies found in the Burſæ, the Joints, or other ſhut Sacs of the Body.

FIG. I. and II.

SHOW the Fore and Back Parts of a cartilaginous Body, which, after an Inciſion, was extracted in 1778 from the Joint of the Knee of a living Perſon, by Mr F. Dewar Surgeon in Edinburgh.

FIG. III. IV. AND V.

REPRESENT three, of above twenty, ſuch cartilaginous Bodies, which formed in the Knee-Joint of one Perſon.

FIG. VI.

REPRESENTS another of theſe cartilaginous Bodies biſected.

FIG. VII. VIII. IX. X. XI. XII. XIII. XIV. XV. XVI. XVII. XVIII.

REPRESENT, of the natural Size and magnified, a dozen of fifty ſuch cartilaginous Bodies, which were extracted from the Burſa of the Flexor Pollicis Longus.

In one half nearly of the whole number, peduncles or filaments, by which

pro-

TAB. IX.

Fig. 1.

Fig. 2.

TAB. IX.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 19.

Fig. 6.

Fig. 20.

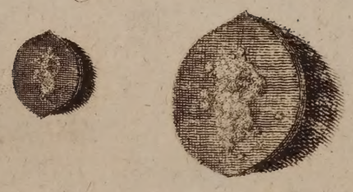

Fig. 21.

Fig. 22.

Fig. 23

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TAB. IX.

Fig. 7.

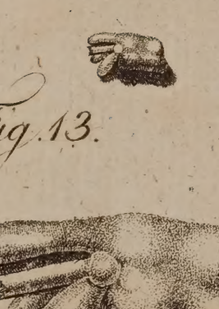

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

Fig. 13.

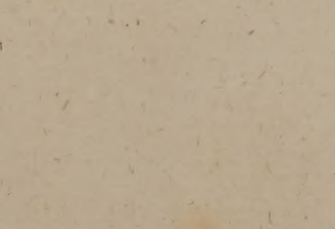

Fig. 14.

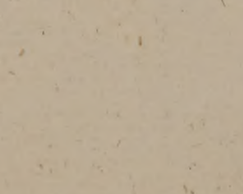

Fig. 15.

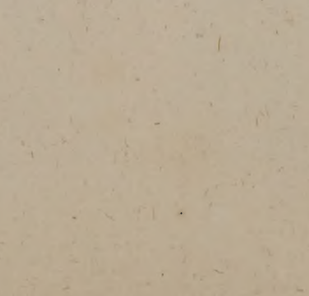

Fig. 16.

Fig. 17.

Fig. 18.

Tho.s Donaldson del.t & Sculp.t

probably theſe bodies were attached to the burſa, are diſtinguiſhable. In the others, theſe bodies ſeem quite ſmooth.

FIG. XIX. AND XX.

REPRESENT a ſmall, hard, cartilaginous Body, found in a Caſe of Hydrocele of the vaginal Coat of the Teſticle, adhering ſlightly to the Teſticle and Epidydimis, of the natural Size and magnified.

FIG. XXI. XXII. XXIII.

REPRESENT three other ſuch cartilaginous Bodies, of the natural Size and magnified, found within the vaginal Coat of the ſame Patient.

SECT.

SECT. XII.

EXPLANATION OF TABLE X.

THE Firſt Figure of this Table repreſents the middle Part of the Arch of the Colon of an Adult, with a Hole eroded in it, in conſequence of Dyſentery; and hence the true Tympany was produced by the Air eſcaping from the Colon into the Cavity of the Peritonæum or Abdomen.

FIG. II. III. IV. V.

OF this Table repreſent two Holes formed in the Jejunum by Pins tied together, which had been accidentally ſwallowed.

IN all theſe figures,

A B. Repreſent the jejunum.

C. Its meſentery.

D E. An inciſion, by which the cavity of the jejunum is laid open.

F. Two large pins tied together, with their points turned different ways.

G. The point of one of the pins which had occaſioned a hole in the jejunum, and was found ſituated as the figure repreſents it.

H. A hole which unqueſtionably had been occaſioned by the point of the other pin; although on opening the body the pin was not found in the hole.

I K. Two membranous adheſions occaſioned by the inflammation which the pins had excited; and by means of which the edges of the two holes in the jejunum were firmly fixed to L, a part of the meſocolon.

FINIS.

TAB. X *Fig. 1.*

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TAB. X. *Fig. 2.*

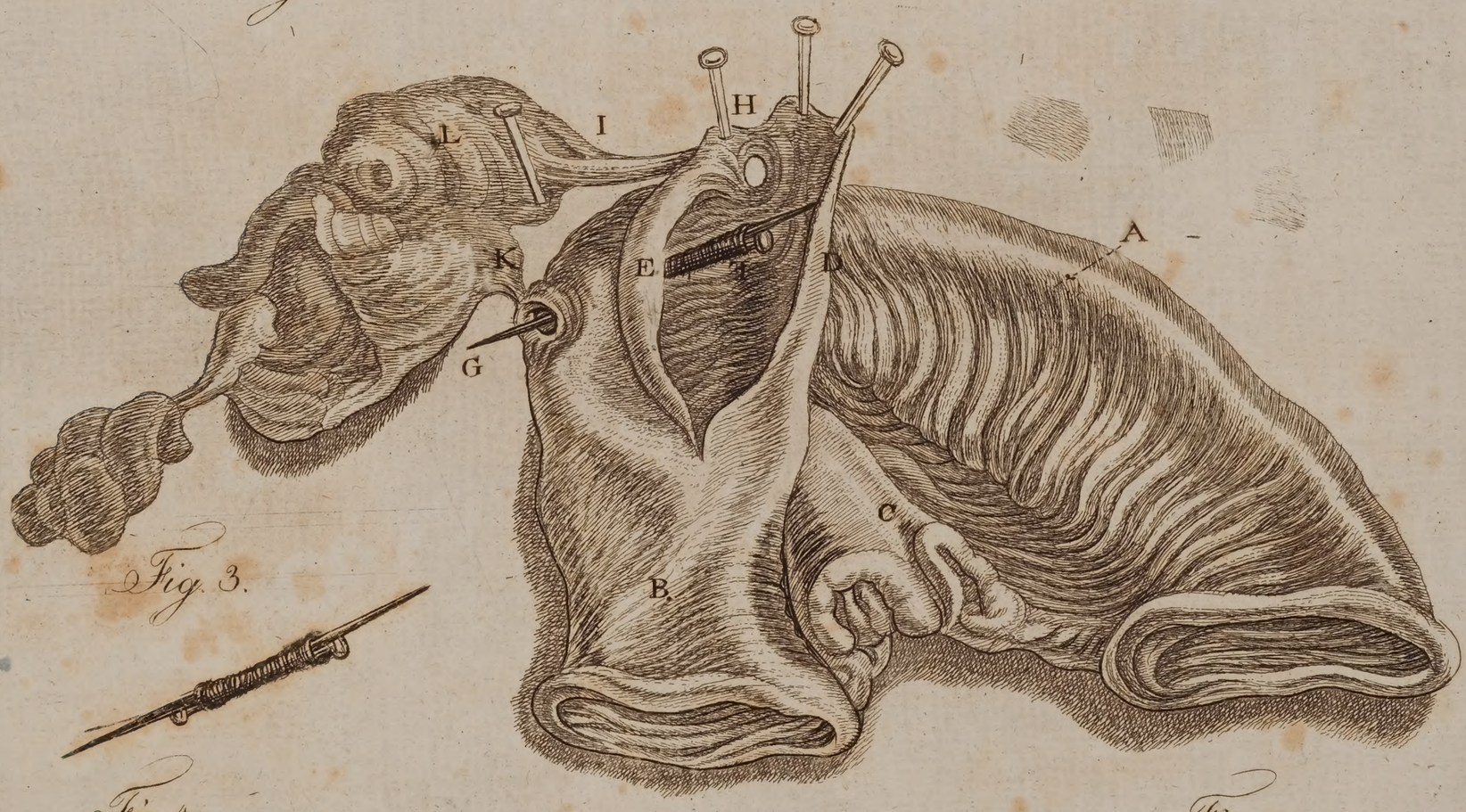

Fig. 3.

Fig. 4.

Fig. 5.

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